Duvaucel. Mr. Ogilby, in his 'History of Monkeys,' when remarking upon M. Duvaucel's adventures with the Entellus, informs us that by "Gouptipara," the name of the place where the animal was shot, "he appears to mean the city of Goalpara." On the contrary, however, he appears to mean nothing of the kind; for he distinctly states that the city of Gouptipara, where he shot the animal, was a holy place with many temples, and situated on the river Hooglee, somewhere near Chandernagore in Lower Bengal, and therefore not far from Calcutta; whereas Goalpara is situated on the Burhampooter river in Assam, about 200 miles away. The fact is that Mr. Ogilby, being better acquainted with menageries than with the geography of India, took upon himself to alter the names of the places, and by so doing gave rise to the erroneous idea that the Entellus occurs in Assam. But besides giving us the River Hooglee and Chandernagore as guides to the locality, M. Duvaucel likewise plainly speaks of his having been thwarted by "the Bengalese," who constantly scared away the monkeys; whereas, had he alluded to Goalpara, he would have called the people "Assamese."

Hence the error in this respect appears to be entirely owing to Mr. Ogilby's ignorance of the geography of the country, and to his unwarrantable alteration of the name furnished by M. Duvaucel.

The remarks now made, founded upon long and patient research into the history of the animal, will, I trust, not prove unacceptable to my brother naturalists in Europe.

December 12th, 1867.

Dr. J. E. Gray, F.R.S., V.P., in the Chair.

The following extract was read from a letter addressed to the Secretary by Dr. John Kirk, C.M.Z.S., dated Zanzibar, Sept. 7th:—

"In the collection of animals in spirits now ready for transmission to England by the first opportunity, I have placed several specimens of the *Galago* of the island of Zanzibar; which, I can now assure you, is very different from that of the opposite coast. I have kept specimens of both here: the colour, form of snout, size of ears, &c. are very distinct. The species of the coast is, no doubt, *G. crassicaudatus*, while I presume the island one is *G. agisymbanus*, of which there are no specimens in England.

"I am not satisfied regarding the little Antelopes of this island, whether there are not two species; the texture of the fur varies much, also the size of ears; but I have not had an opportunity of comparing a sufficient number of specimens to be certain.

"I have only three species of Bats from Zanzibar; this is singular,

as in Zambezia there are so many. Of Butterflies I have not collected above forty kinds; but some of these are very fine.

"From Mozambique I have a valuable collection of Snakes and Insects, perhaps nothing new, but representing rare species.

"This has not been to me a year productive in specimens of natural history; but I hope in two months to get off for a few days to Lamoo, where are the *Numida vulturina* and other nice things. A tame hen of this *Numida* lived for some time at the French Consulate here, but has been stolen lately; it was an extremely handsome bird. They seem to be common at Lamoo. When the 'Syria' was there the officers saw several in the market, and killed them for the table, keeping only the skin. I had asked them to look out for it; but they mistook the bird when they saw it, thinking they were to seek for something much more rare."

Dr. Peters communicated a note on the relation of the tympanic bone to the mandible in the Marsupials, stating that he had found in a young *Halmaturus bennettii* (85 millim. long without tail) and in a young *Didelphys*, that the former bone is inserted into the cavity formed by the angle of the latter. He considered that this temporary glenoid surface is to be compared with the permanent glenoid cavity in birds, or at least to a part of it, as it is well known that relations which are permanent in lower animals are often represented by a temporary condition during the period of evolution in higher classes. In the author's opinion this observation tends to confirm the view that so important and constant a bone as the tympanic is in the Mammalia does not disappear at once in other vertebrates. It also obviates one of the principal objections urged against the homology of the *os tympanicum* with the quadrate bone of birds and reptiles, viz. that it is never united to the lower jaw; at the same time it explains the peculiar form of the angle of the lower jaw in the Marsupials.

Mr. Sclater called attention to the important fact of a fat male Eland (*Oreas canna*), bred by Lord Hill, at Hawkstone, Shropshire, being exhibited at the cattle-show of the Smithfield Club, and being about to be offered for sale at the close of the show for the market —the first event that had ever happened of this kind. The animal was stated to be a male, aged six years and seven months, and to weigh alive 1760 lb.

In answer to some inquiries on the subject made last summer, Lord Hill had forwarded to Mr. Sclater the following communication:—

"I wish I could send you an account of the Elands I have bred and disposed of since I purchased the pair from the Zoological Gardens, as the return would be most satisfactory. Unfortunately I have kept no record, which I have often regretted; but I can state that I have not had a single case of disease among them, that the females have bred as regularly as possible, except on one occasion (when I used too young a male, about a year and a half old), and that the losses

by accident have been very trifling. The male I originally purchased at the Gardens I fattened and shot. Its meat I thought excellent. The female that came at the same time died in the park, from overeating dried leaves. Another male injured his shoulder, and I was obliged to make away with him. One calf also, this last year, broke its hind legs by some means; and another died soon after its birth about two years ago. These are all the casualties I can recollect, and I really am not able to tell you how many I have disposed of; but I have parted with several pairs to Zoological Societies on the Continent, and others in England. I have now five females remaining (all, I believe, in calf), and three others born last summer, with two males—the one I got from the Gardens about two years ago, and an older one which I shall be glad to dispose of; he is feeding well, and would either do for the butcher or for stock-purposes.

"It has long been a surprise to me that nobody else has taken a fancy to the Eland. It is unquestionably a noble animal, and requires no more attention than a cow, living well upon the same food, out the whole year with merely a shed to run under, and acclimatized as much as any animal can be. I am very sorry I cannot send you a more detailed statement; but any questions you may ask I shall be happy, if possible, to answer."

The herd of Elands in the Society's Gardens was stated to consist at this time of seven individuals, namely:—

No.	Sex.		
1.	Female	Born in the Gardens.....	Dec. 20th, 1861.
2.	Female	Born in the Gardens.....	Feb. 22nd, 1866.
3.	Male	Born in the Gardens.....	Feb. 28th, 1866.
4.	Female	Presented by Lord Egerton.....	Oct. 24th, 1866.
5.	Male	Born in the Gardens.....	April 13th, 1867.
6.	Female	Born in the Gardens.....	May 8th, 1867.
7.	Female	Born in the Gardens.....	Dec. 5th, 1867.

The following papers were read:—

1. Notes on the Visceral Anatomy of *Hyomoschus aquaticus*. By W. H. Flower, F.R.S. &c., Conservator of the Museum of the Royal College of Surgeons.

Of the aberrant family of the *Tragulidæ*, situated on the confines of the great order Ruminantia, and leaning strongly in the direction of the Artiodactyla omnivora, the African genus *Hyomoschus* has generally been considered the most aberrant and pig-like form. This opinion has been founded chiefly upon the structure of the extremities, as the visceral anatomy is at present entirely unknown. It was with much interest, therefore, that I availed myself of the opportunity of investigating certain points connected with the organization of this animal, afforded by the acquisition, by the Museum

of the Royal College of Surgeons, of the body of a young female *Hyomoschus aquaticus*, which died in June last, in the Gardens of this Society.

The animal was not quite full-grown, the milk-teeth being still in place, with the first and second permanent molars. The various organs were compared during the examination with those of a specimen of *Tragulus javanicus* of the same age and sex.

The tongue is $3\frac{1}{4}$ inches long, and $\frac{8}{10}$ inch in average breadth, rather fleshy, with sides nearly parallel, flat above, and obtusely pointed at the tip. Along the anterior half is a median linear depression. Numerous white, flat-topped, circular, circumvallate papillæ are scattered irregularly over all parts of the surface, those at the hinder part being rather larger than the others. Quite at the root is a group of large, closely set, sharp-pointed, conical papillæ. These seem to be of the same class as the minute pointed papillæ with which the entire surface of the organ is beset developed to an unusual degree. On each side of the upper surface, near the posterior end, is a long, narrow, and deep groove, $\frac{3}{10}$ inch in length, placed obliquely, so that the posterior end inclines towards the middle line. The edges of this groove are thickened, white, and free from papillæ; and within it is a linear papillary elevation, with a faintly notched free border, projecting slightly above the level of the surrounding parts. This, which appears to be a modification of a circumvallate papilla, occurs also in *Tragulus javanicus*.

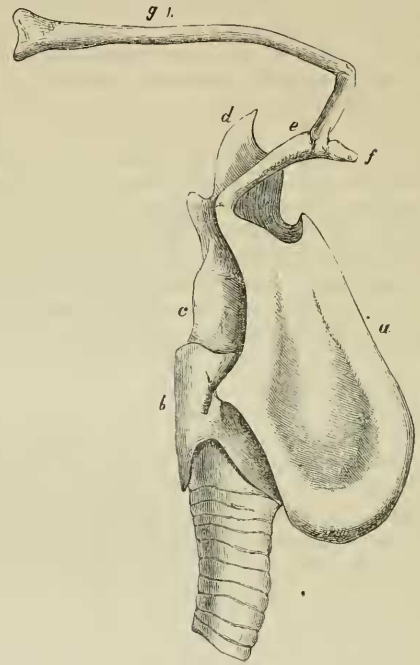
The larynx presents a peculiarity in its construction which is not met with in *Tragulus*, or, as far as my knowledge extends, in any other ruminant. The whole organ is remarkably large and prominent—a circumstance mainly caused by the extraordinary development of the thyroid cartilage (*a*, fig. 1, p. 956). This is formed as usual, by two broad lateral plates united at a very salient angle in front. The entire length of the cartilage in the middle line is $1\frac{7}{10}$ inch. Its upper border has three distinct triangular projections—one in the middle line, broader and shorter than the others, and one on each side, attached to the inferior cornua of the hyoid. The lateral margins, $\frac{8}{10}$ inch in length, are gently and regularly excavated, and terminate below in a short, pointed triangular process for articulation with the cricoid cartilage. Below this point the thyroid is continued downward; and instead of being open below as usual, its sides are united across the middle line, so as to form a considerable, rounded, compressed pouch, placed in front of the commencement of the trachea.

In *Tragulus javanicus* the whole vertical depth of the thyroid is but $\frac{3}{10}$ inch, and it is widely open below, and presents no anterior prominence. In the larynx of the Sheep there is a well-marked projection of the anterior edge of the thyroid rather below the middle, but offering only a slight indication of that which is so remarkably developed in *Hyomoschus*.

The cricoid cartilage (*b*) forms a strong shield behind, $\frac{7}{10}$ inch in length, and the same in breadth. Its thickened upper margin is hollowed in the middle line, and on each side presents a large oblique

articular surface for the corresponding arytenoid cartilage. The lower border has a long pointed median prolongation. From each side stands out a short triangular process for articulation with the lateral processes of the thyroid; and from the same part descends, very obliquely downwards and forwards, a long, rather slender prolongation of the cartilage, which, meeting its fellow in the middle line in front, completes the ring.

Fig. 1.



Side view of larynx of *Hyomoschus aquaticus*. Nat. size.

a. Thyroid cartilage. *b*. Cricoid cartilage. *c*. Arytenoid cartilage. *d*. Epiglottis. *e*. Thyrohyal. *f*. Basihyal. *g*. Stylohyal.

The arytenoid cartilages (*c*) are flattened plates almost quadrilateral in figure, $\frac{4}{10}$ inch in diameter; the aryteno-epiglottidean ligament is attached to the middle of their upper margin, the thyro-arytenoid ligament (vocal cord) to the antero-inferior angle; and they are articulated to the cricoid cartilage by their posterior inferior angle.

The cavity in the interior of the larynx may be divided into two parts—a direct uninterrupted passage to the trachea posteriorly, and in front of this a capacious but laterally compressed pouch or diverticulum, situated within the expanded thyroid cartilage. Owing to

the great antero-posterior breadth of the base of the arytenoid cartilages and their distance apart, the vocal cords are placed nearly vertically in the sides of the larynx, and thrown unusually far from its posterior wall, so that when they are brought into contact a cylindrical tubular air-passage remains open behind them, but the communication between that passage and the thyroid pouch is shut off. These cords are exactly $\frac{1}{2}$ inch in length, and tolerably prominent.

There are no lateral membranous pouches or sacs connected with the larynx.

Knowing little of the habits of the animal during life, I am unable to throw any light upon the mode in which this singular modification of the vocal organ is related to its economy.

Each lung consists of a single lobe, of general triangular form, with a flattened tongue-shaped projection arching forwards from the apex. This projecting lobule is much larger on the right side than on the left, and has a distinct bronchial branch from the trachea, given off $\frac{1}{2}$ inch above the bifurcation, wanting on the left side. The right lung has, moreover, a small accessory lobule projecting forwards from the internal border just below the root of the lung.

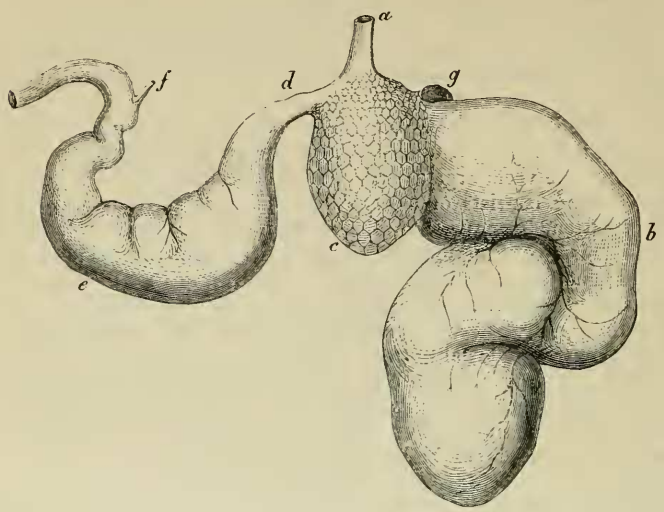
The lungs thus conform in the general principle of their construction with those of *Tragulus javanicus*; but in the latter they are rather more subdivided by notches, and the upper and lower accessory lobules of the right lung are relatively larger and more distinct.

The heart presents nothing unusual: the great vessels arise from the arch of the aorta as in *Tragulus*: viz., the first, nearly $\frac{3}{4}$ inch long, gives off the right subclavian, and then divides into the right and left common carotid; the second branch, arising close to the last, is the left subclavian.

The stomach (fig. 2, p. 958) consists of three principal compartments, as in *Tragulus*. The œsophagus (*a*) opens directly into the middle compartment or *reticulum* (*c*), which is a pyriform or egg-shaped sac, with the small, obtusely pointed end turned forwards and to right. When moderately distended it is 4 inches long and $2\frac{3}{4}$ inches wide at the base. The honeycomb-like reticulations are distinctly seen all over this compartment, from the exterior, as faint white lines forming hexagons, very much larger at the pointed free end than near the base. The broad end or base is directly continuous with the rumen (*b*), being only marked off from it by a slight constriction. The last-named cavity is a long cæcal pouch, having a sigmoid flexure, and being partially divided, by constrictions at the concavities of the bends, into three compartments. Its greatest length (in this folded state) is 9 inches. $\frac{3}{4}$ inch to the right of the entrance of the œsophagus the true digestive stomach or *abomasus* (*e*) commences by a very constricted tube not more than $\frac{1}{3}$ inch in diameter. This speedily dilates into an elongated tubular sac, largest near its proximal end, and gradually narrowing towards the pylorus. In its natural state this stomach is sharply curved upon itself, and puckered at its upper border or lesser curvature; but when the membranes are detached this curvature and all the foldings disappear,

except one natural rectangular bend upwards near the pyloric end. The length of this compartment when straightened is 7 inches, its greatest diameter $2\frac{1}{4}$ inches.

Fig. 2.



Anterior surface of stomach of *Hyomoschus aquaticus*. One-fourth of nat. size.

a. Œsophagus. *b*. Rumen. *c*. Reticulum. *d*. Rudiment of psalterium. *e*. Abomasus. *f*. Biliary duct. *g*. Spleen.

On opening the cavities the villi on the internal surface of the rumen were seen to be long and narrow, especially towards the base of the compartment; they measured mostly $\frac{2}{10}$ inch in length. In the reticulum the villi are very sharp-pointed, as usual. The passage along the top of the reticulum from the œsophagus to the orifice leading to the true stomach is smooth, $\frac{3}{4}$ inch long, and bounded by thick but not very prominent folds of membrane. This orifice is $\frac{1}{4}$ inch in diameter. The part which immediately follows the orifice (*d*), though it cannot be called a distinct compartment as in ordinary ruminants, is $\frac{6}{10}$ inch in length, slightly dilated and marked off by a faint constriction from the remainder of the abomasus, from which, moreover, it is most distinctly separated by a thick opaque epithelium with short villi, like those covering the laminæ of the psalterium in other ruminants; there are also indications of longitudinal plications of the mucous membrane. The remainder of the last cavity has (as usual) a smooth soft lining membrane, free from villi.

There is thus a decided indication or rudimentary condition of the psalterium or third compartment of the ruminant's stomach; and contrasting this with the statement by Alph. Milne-Edwards, in his valuable monograph on the Chevrotains, that in the genus *Tra-*

gulus, "Ce dernier estomac [the abomasus] naît directement du bonnet [reticulum] sans qu'il y ait à son origine, dans aucune des quatre espèces que j'ai disséquées, le moindre indice de l'existence d'une partie comparable au feuillet [psalterium] des Ruminants ordinaires"*, it might be inferred that in the structure of the stomach *Hyomoschus* formed a link between *Tragulus* and the true ruminants, instead of inclining in the opposite direction as commonly supposed. But the *Tragulus javanicus*, which I dissected for comparison with the present animal, showed precisely similar indications of a rudimentary psalterium; and the same may be observed in a preparation of the stomach of a *Tragulus kanchil* in the College Museum, No. 554, Physiological Series, thus correctly described in the Catalogue†:—"The passage leading from the œsophagus to the third cavity is bounded by two low parallel ridges; the longitudinal lamellæ, which are the characteristics of this cavity in other ruminants, are wanting; but as it appears to have had a cuticular lining, we may regard it as a rudimentary form of this cavity, and distinct from the fourth cavity, from which it is partially separated by a semilunar fold."

The stomach of *Hyomoschus* presents, therefore, no obvious character by which it can be distinguished from that of a member of the allied genus *Tragulus*. The same may be said to be the case with all the other portions of the alimentary canal.

The small intestine is about 16 feet in length; the large intestine 6 feet, not sacculated, scarcely wider than the small intestine, averaging rather less than $\frac{1}{2}$ inch in diameter when fully distended. In the last foot of its length it gradually widens, attaining nearly 1 inch. The cæcum is perfectly simple, $3\frac{1}{2}$ inches long.

The spleen lies on the diaphragmatic surface of the stomach, in the groove which divides the reticulum from the rumen (fig. 2, *g*). It is flattened and pyriform, the largest end being turned forwards and to the right. Its length is 2 inches, its greatest breadth $\frac{3}{4}$ inch. On the left margin, rather behind the middle, is a deep notch; the portion behind this is thinner and flatter than that in front.

The liver presents a smooth upper surface, irregularly oval in outline, the broadest end to the right, $4\frac{1}{4}$ inches long from side to side and $2\frac{3}{4}$ inches in greatest antero-posterior width, undivided, except by a notch on the anterior border separating a smaller left from a larger right lobe. On the under surface the left lobe has no further subdivisions. The right lobe has two accessory lobes:—the smaller, but most distinct, pointed and tongue-like, close to the longitudinal fissure, near the centre of the organ; the other, broader and with the free extremity more obtuse, close to the right lateral margin. The transverse fissure lies between these. The gall-bladder is large, and projects freely beyond the anterior margin of the right lobe.

* 'Recherches Anatomiques, Zoologiques, et Paléontologiques sur la famille des *Chevrotains*,' Paris, 1864, p. 62.

† 'Descriptive and Illustrated Catalogue of the Physiological Series of Comparative Anatomy contained in the Museum of the Royal College of Surgeons,' London, vol. i. 2nd edit. 1852, p. 168.

The liver is thus formed on the same general principle as that of *Tragulus*, but it is rather more simple; the fissure between the right and left lobe and that for the gall-bladder are less deep. The middle accessory lobe is broader and shorter and less distinctly marked off from the rest of the organ; and, especially, the right accessory lobe is relatively larger.

[*Postscript.*—Since these notes were communicated to the Society, I have had an opportunity, through the kindness of Professor Huxley, of examining the body of an adult female *Hyomoschus*, sent to him in spirit from the west coast of Africa. In all its principal anatomical characters it agreed perfectly with the specimen above described. The larynx was of the same form and dimensions. In the stomach the rudimentary psalterium, as distinguished from the abomasus by the different character of its lining membrane, was equally distinct. The vagina was 5 inches in length; the uterus $3\frac{1}{2}$ inches to the point of bifurcation, sharply bent back on itself near the upper end, and terminated in a pair of rather short, closely curled cornua.—February 1st, 1868.]

2. Additional Notes on the Osteology of the *Lemuridæ*. By St. George Mivart, F.L.S., Lecturer on Comparative Anatomy at St. Mary's Hospital.

When, in November 1864, I had the honour of laying before the Zoological Society my notes on the crania and dentition of the *Lemuridæ**, I regretted my inability to determine certain points, owing to the want of the requisite specimens.

During a recent visit to Paris I have had, through the kindness of Professor Milne-Edwards and of his son M. Alphonse Milne-Edwards, the opportunity of supplying some of these omissions by an examination of the specimens preserved in the National Collections at the Jardin des Plantes. In addition to this, since my return, M. Alphonse Milne-Edwards has had the great kindness to have extracted from the skin and sent to me the bones of a specimen of the *Cheirogaleus furcifer* of Isid. Geoff. St. Hilaire, including the tarsus—a part I so much regretted, three years ago, not being able then to examine.

The specimen in question forms part of the extremely valuable collection lately brought from Madagascar by M. Alfred Grandidier, a gentleman to whom science is very much indebted already, but who, in spite of the attractions of a Society he is so well calculated to adorn, has just again set out for three years' more labour in the same interesting field of biological research.

Amongst the zoological rarities preserved at Paris, and as yet absent from our own collections, is the skeleton of *Hapalemur*. This

* P. Z. S. 1864, p. 611.

I found to exhibit all those cranial and dental characters detailed in my former paper, except certain trifling differences resulting from the immature condition of the specimen. This immature condition, however, enables me now to affirm that there *is* no interparietal bone, and that the præmaxilla *is* exceedingly small.

The cervical region is elongated, and the dorsal region is short; but the neural laminæ of the cervical vertebræ do not exceed those of the dorsal vertebræ in antero-posterior extent. The atlas has but one continuous posterior articular surface for the axis; its transverse processes are not large; and it has no neural spine.

The axis vertebra has a considerable spinous process, but it is not produced backwards. All the other cervical vertebræ have small neural spines.

There are twelve dorsal and seven lumbar vertebræ, and these much resemble the corresponding vertebræ of *Lemur*.

The scapula closely resembles that of the last-named genus; the carpus is provided with an os intermedium; and the fourth digit of the manus is the one extending furthest forwards.

The ilium is very much like the ilium of *Lemur*; its posterior inferior (the inferior anterior of Man) spinous process is well marked.

The femur has a slight indication of a third trochanter, and the patella is elongated.

The tarsus is short, and decidedly less than one-third the length of the tibia, showing no approximation to the structure presented by *Microcebus pusillus*, still less to that of *Galago*.

The fourth digit of the pes projects most.

	inches.
Length of the femur	4·70
——— of the tibia	4·30
——— of the os calcis	·93
——— of the cuboides	·41

At the Jardin des Plantes are also preserved the skeletons of *Cheirogaleus milii* and of *Microcebus pusillus*.

The former is the typical specimen of the genus *Cheirogaleus*; and the latter is the type of the genus *Microcebus*, being the specimen which was ultimately named *Microcebus rufus* by Geoffroy St. Hilaire*.

In my former paper I expressed a doubt as to whether the genus *Microcebus* would not have to be merged altogether in the older genus *Cheirogaleus*†. The examination, then, of these two typical specimens should go far to decide this question; for if they show well-marked and not inconsiderable differences, then the generic distinction may be provisionally retained, unless some other species be found to exhibit so completely intermediate a structure as to do away with the value of the differential characters.

Now, on comparing these two specimens, I find that not only is

* Cours de l'Hist. Nat. Mamm. leçon vi. p. 26, 1828. That author had, however, previously named it *pusillus* (see Mag. Encyc. i. p. 48, 1776).

† P. Z. S. 1864, p. 619.

it true that there is in *C. milii*, as De Blainville remarks*, a certain elongation of the astragalus as compared with the other tarsal bones, but the naviculare is quite short comparatively, instead of being much elongated as it is in *M. pusillus*. Indeed, in the latter species, the naviculare is absolutely as well as relatively longer, although in it (*i. e.* in *M. pusillus*) the length of the dorsal and lumbar regions together is only 2·75 inches, while the same part in *C. milii* is 5 inches in length.

	C. milii. inch.	*M. pusillus.* inch.
Length of cuboid	·21	·16
——— of os calcis	·52	·36
——— of dorsum of naviculare	·17	·20
——— of astragalus	·35	·20

The dimensions of the tarsal bones of *M. myoxinus* are almost the same as those of *M. pusillus*†. In addition to this distinction in the tarsus, the palate has no defects of ossification in *C. milii*; the fifth cusp of the hindmost lower molar is rudimentary, instead of being distinct; there is a small malar foramen, while in *M. pusillus* there is none. The carotid foramina on the *basis cranii* are also very conspicuous, instead of being almost hidden by the auditory bullæ; the pterygoid fossæ are also larger; and, lastly, the first upper premolar is slightly caniniform and considerably longer than the second one, instead of being smaller and slightly shorter than the second one as in *M. pusillus*.

On the other hand, *C. milii* agrees with *M. pusillus* in having the palate prolonged, the posterior palatine foramina large, a distinct interparietal bone, in the absence of any enlargement of the mastoidal region of the periotic, and in the other characters before assigned to *Microcebus*‡.

In both skeletons there are thirteen dorsal and seven lumbar vertebræ; but neither the axial nor the appendicular skeletons present any noteworthy characters in either specimen.

The close affinity of the *M. myoxinus* of Peters§ to *M. pusillus* being as unquestionable as is their specific distinctness, it is desirable to know if it presents any characters tending to bridge over the gap separating the last-named species from *C. milii*.

Now *M. myoxinus* differs from *M. pusillus*, besides external characters (as has been pointed out by Dr. Peters‖), in its shorter and less-pointed muzzle, in the greater production forwards of the præmaxillæ, the larger size of the openings in the palate, and also, possibly, in the somewhat longer symphysis of the mandible. Moreover the contour of the anterior nares, viewed in profile, is less concave, and the palate is less prolonged backwards. Again, the first premolar is quite as extended, vertically, as is the second, instead of

* Ostéographie, *Lemur*, p. 12.

† Professor Peters has been kind enough to send me the exact length of the tarsal bones of his *M. myoxinus*.

‡ P. Z. S. 1864, p. 640.

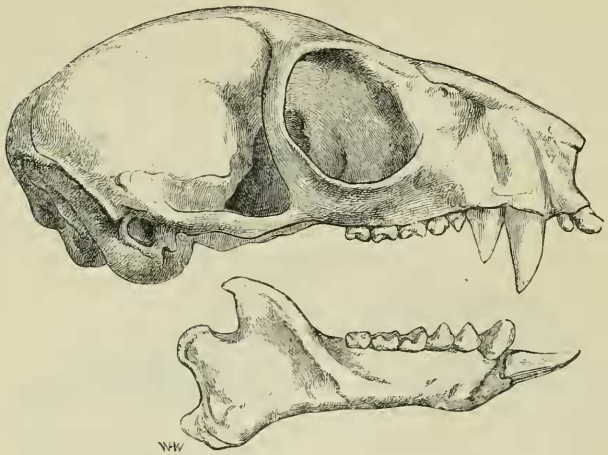
§ Reise nach Mossambique, p. 14. ‖ Ibid. p. 19.

being somewhat less so, as is the case in *M. pusillus*. This shortness of the first premolar is not the effect of immaturity, as I before thought might be the case, as the typical specimen of *M. pusillus* is fully adult. The predominance in size, on the other hand, of the first over the second upper incisor is greater in *M. myoxinus* than in *pusillus*. Finally, the tarsus, which, in *M. pusillus*, is only as 11·7 to the length from the snout to the root of the tail, taken at 100, is in *M. myoxinus* 14·6 to the same dimensions similarly estimated.

Thus in the greater inequality of size between the two upper incisors on each side, and in the greater equality of length of the first two upper premolars, *M. myoxinus* is intermediate between *M. pusillus* and *C. milii*; but these differences are slight in comparison to the points of resemblance between it and *M. pusillus*, its tarsal structure (as has been said) agreeing, in size and the proportions of its parts to one another, altogether with that of the last-named animal.

With regard to *Cheirogaleus furcifer*, part of the skeleton of which, as I before said, has been so kindly transmitted to me by M. Alphonse Milne-Edwards, I find that its skull and dentition agree (as far as the worn condition of the grinders permits comparison) with the imperfect specimen in the British Museum as to the characters enumerated in my former paper*, except that there is a small malar

Fig. 1.



Cheirogaleus furcifer. Scale twice nat. size.

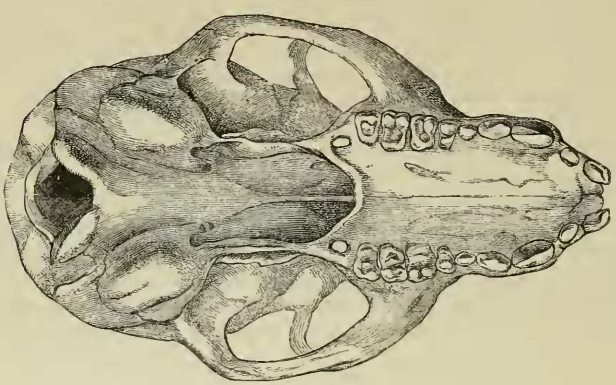
foramen on each side, that the angle of the mandible is decidedly produced downwards as well as backwards, and that there is no trace of a fifth cusp to the last inferior molar.

I find also conspicuous carotid foramina placed, as in *C. milii*, near

* P. Z. S. 1864, p. 622.

together, and not at all hidden by the auditory bullæ. The pterygoid fossa also is much elongated from behind forwards, but very narrow from side to side, the true pterygoids extending back much more nearly to the same distance, as do the ectopterygoid plates, than is the case in the smaller species (*M. minor*). Compare fig. 2 with the figure of the latter species in P. Z. S. 1864, p. 615.

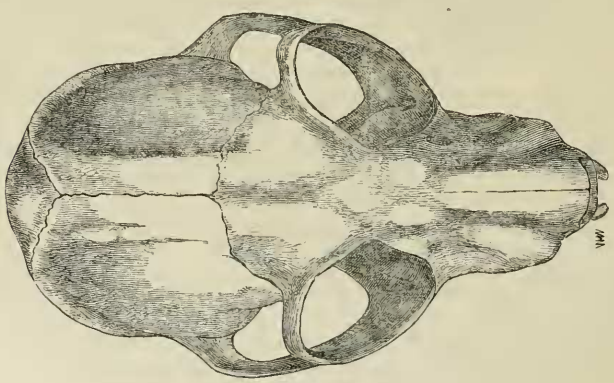
Fig. 2.



Cheirogaleus furcifer. Scale twice nat. size.

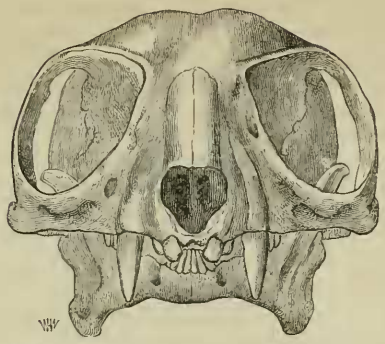
The extent of the præmaxilla cannot be ascertained, the suture being completely obliterated. As regards the skull, then, *C. furcifer* agrees altogether with *C. milii*, and even carries still further those characters (length of first upper premolar and smallness of last lower molar) in which the latter species differs from *M. pusillus* and *M. myoxinus*.

Fig. 3.



Cheirogaleus furcifer. Scale twice nat. size.

Fig. 4.



Cheirogaleus furcifer. Scale twice nat. size.

As regards the tarsus, however, there is a great difference, as the following dimensions show:—

	inches.
Extreme length of the tibia	2·40
Extreme length of the cuboides	0·27
Extreme length of the os calcis	0·74
Length of dorsum of naviculare	0·36
Length from proximal end of calcis to distal end of naviculare	0·90
Length of astragalus	0·37
Breadth of os calcis and naviculare, measured across their narrowest part	0·22

Thus, instead of the dorsum of the naviculare being a little less than half the extreme length of the astragalus, it nearly equals it; while the latter bone is only half the length of the os calcis, instead of being equal to about two-thirds of its length; moreover the cuboid is considerably shorter than the dorsum of the naviculare, instead of being somewhat longer than the latter. In all these respects the tarsus of *C. furcifer* closely resembles that of *M. pusillus**, and differs widely from the tarsus of *C. milii*. The distinction therefore between *Cheirogaleus* and *Microcebus*, based upon tarsal structure, falls to the ground, unless *C. furcifer* be placed (as I placed in 1864†) in the latter genus along with *M. pusillus* and *M. myoxinus*. But since I have examined the skin and skeleton of *C. milii* I can no longer be satisfied with such an association, as there can, I think, be no doubt but *C. milii* and *C. furcifer* are very closely allied forms.

It will nevertheless be possible (and perhaps even useful) still to retain, provisionally at least, the distinction between *Cheirogaleus*

* As I anticipated that on investigation it would turn out to do (P. Z. S. 1864, p. 623).

† Guided by its apparently elongated foot, as seen in the mounted skin in the British Museum.

and *Microcebus*, though reposing mainly, if not exclusively, on a few cranial and dental characters. Perhaps, however, the newly described species *M. coquereli** may furnish grounds for the abandonment of this distinction.

I find in *C. furcifer* a distinct os intermedium and the ulnar condyle of the humerus perforated.

There remain to be noticed the three forms described by Dr. Gray under the names (1) *Galago minor*† (or *Lepilemur murinus*‡), (2) *Cheirogaleus smithii*§, and (3) *Cheirogaleus typicus*‖.

The first of these, the skull of which has been figured in the 'Proceedings of the Zoological Society'¶, agrees completely with Dr. Peters's *M. myoxinus*, except in the reduplication of the palatal defects of ossification, and in a slightly less degree of backward prolongation of the palate. It also agrees with *M. myoxinus* in points by which that species differs from *M. pusillus*, and which have been enumerated above.

The tarsus I have not been able to examine; but it, no doubt, is also similar.

The two skins of *Galago minor* (my *Microcebus minor*) in the British Museum agree with *M. myoxinus*, and differ from *M. pusillus*, in the greater size of the ears; and Dr. Gray remarks**, "The figure of Dr. Peters agrees pretty well with our specimen; but the whole colour of the fur is rather darker, and the ears are larger." The latter difference is trifling indeed, considering the contraction of the ears in drying—a distortion the frequent occurrence of which, as also of its converse "stretching," Dr. Gray proceeds almost immediately afterwards to notice.

M. minor, however, is very much less red than *M. myoxinus*, being a "pale grey," whereas the usual colour in the last-named species, according to Dr. Peters, is rusty brown; and this difference is so striking that for the present it will be better to treat these forms as specifically distinct.

As regards *Cheirogaleus smithii*, the typical specimen (which is in the British Museum) differs from *M. myoxinus* and agrees with *M. pusillus* in the following points:—in the smaller size of the ears, and in having the first upper premolar rather less vertically extended than the second. It may therefore be the case that *C. smithii* is nothing else than *M. pusillus* (*Le Rat de Madagascar*)—and the more probably so, as Dr. Gray himself remarks†† that Buffon's figure of that animal well represents his (Dr. Gray's) *C. smithii*. On the other hand, in *C. smithii* the upper incisors are as unequal as in *M. minor* or as in *M. myoxinus*.

Dr. Gray describes the type of his *C. smithii* as being "pale bay,"

* Recherches sur la Faune de Madagascar, par M. H. Schlegel et M. François P. L. Pollen, (Leyden, 1867) p. 12, pl. 6.

† Ann. and Mag. Nat. Hist. 1842, x. p. 257.

‡ P. Z. S. 1863, p. 143.

§ P. Z. S. 1863, p. 143.

‖ P. Z. S. 1863, p. 142.

¶ 1860, p. 144, and 1864, p. 615.

** P. Z. S. 1863, p. 144.

†† P. Z. S. 1863, p. 143.

whereas the usual colour of *M. pusillus* is a very red brown. But all the specimens in the Paris Museum are not alike in colour, and one especially is very pale. The difference in colour alone should not, therefore, I think, prevent the union of *C. smithii* with *M. pusillus*; but, on account of the incisors, I think it better to keep the two forms distinct for the present, till it is proved that the proportions of the incisors are subject to a certain individual variation as they are in *Indris brevicaudatus**.

The specimen in spirits in British Museum, which was named by Mr. Waterhouse "*Microcebus pusillus*" † (but which is now labelled *Cheirogaleus smithii*, and has been described by Dr. Gray under that name ‡), has the upper incisors subequal, and in all probability was rightly named at first.

The third form, *Cheirogaleus typicus*, the typical specimen of which is also in the British Museum, agrees with *C. milii* of Geoffroy in the caniniform first upper premolar, in the great predominance in size of the first over the second upper incisor, also to all appearance in the relative shortness of the tarsus, and, finally, in the short ears. It is described by Dr. Gray § as "reddish brown; cheeks, throat, and beneath white."

The Paris specimens, on the other hand, have the underparts white, but the back is of a delicate fawn-brown; but the difference does not seem to me of such moment as to render it other than probable that *C. typicus* and *C. milii* are one and the same species. The fact that the typical specimen of *C. typicus* is not quite adult should not be forgotten, as age may produce some change in the colour. In size it very nearly indeed equals the specimens of *C. milii* of Paris.

Thus it may be that the seven species which I before enumerated (but which separate enumeration I stated to be only provisional, and by no means intended to imply my conviction of their specific distinctness ‖) will have to be reduced in number if the approximations above indicated turn out to be really necessary. Taking *M. pusillus* as the type of *Microcebus*, *M. minor* and *M. myoxinus* will be the second and third species of that genus.

C. furcifer, on the other hand, will range itself side by side with *C. milii* in the genus *Cheirogaleus*, where it was placed by Isidore Geoff. St.-Hilaire ¶—an approximation evidently natural when the two skins are viewed side by side, and not to be disputed by any one unprepared to erect *C. furcifer* into a new and distinct genus, on the ground of its very elongated first upper premolar and its before described tarsal structure. But even *M. pusillus* and *M. myoxinus* differ from each other as to these points (though in a less degree); so that if the new species (*M. coquereli* of Pollen) presents another

* See P. Z. S. 1866, p. 154, note *.

† The specimen came from the Museum of the Zoological Society, and while there was so labelled by Mr. Waterhouse (see Cat. of Mus. of Zool. Soc. 2nd edit. p. 12. no. 89).

‡ *Loc. cit.* p. 143.

§ *L. c.* p. 142.

‖ P. Z. S. 1864, p. 637.

¶ Cat. des Primates. p. 77.

intermediate condition, then those who would make *C. furcifer* the type of a new genus on such grounds may find themselves logically compelled to make a separate genus of each species.

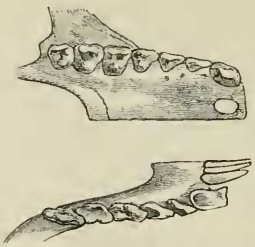
This new form has recently been described and figured by MM. H. Schlegel and François P. L. Pollen (in the first number of their Recherches sur la Faune de Madagascar, 1867, p. 12, pl. 6). The authors remark that it is "plus voisine du *Microcebus typicus* de Smith que des autres espèces;" but add that Dr. Peters found it, although similar in size, to differ from the latter species by its tail washed with black, by the absence of the black circles about the eyes, and by the length of its ears, which are one-third longer than those of the so-called *M. typicus*. The skull, unfortunately, is not yet figured; and in the absence of any description of it, or of the dentition, it is impossible to say definitively whether it should be placed in the genus *Cheirogaleus* or in *Microcebus*. Its resemblance to the British-Museum specimen, however, would suggest its location in the former genus; and, as before said, it may be that its characters may justify (if they offer a certain intermediate structure) the fusion of the two genera into one by the abolition of the term *Microcebus* altogether.

The next form to be noticed is one of great interest, namely *Lepilemur*, a genus still absent (as far as I know) from all the collections in this country. In Paris there is a skin (the type of the genus and species) of *L. mustelinus*, also the skull extracted from it, and a skull of the new species (*L. ruficaudatus*) recently characterized* by M. Alfred Grandidier.

Lepilemur mustelinus has recently been described and figured by Messrs. Schlegel and Pollen (in their work above referred to, at p. 10, pl. 4). *L. ruficaudatus* is as yet unfigured.

In the skulls of both these species there is no trace of any upper incisor; and the specimens show the correctness of M. Gervais's

Fig. 5.



Lepilemur mustelinus.
Copied from Gervais's 'Hist. Nat. des Mammifères.'

* Rev. Zool. July 1867, p. 256.
Cinereo-rufescens, capite nigrescente; artubus posterioribus pallide cinereis. Cauda rufa. Jugulo fulvescente, abdomineque albido.
Long. tot. 56″, corp. 31″, caud. 25″.

figure* as regards the large fifth tubercle to the last lower molar, the shortness of the palate, and the inconspicuousness of the posterior palatine foramina. But not only do they differ from *Microcebus* and *Cheirogaleus* as regards the two points last mentioned; they differ also both from *Lemur* and *Hapalemur* in that the mastoidal region of the periotic is enlarged and inflated.

As in *Microcebus* and *Cheirogaleus*, each upper premolar has but one external cusp†; but the third upper premolar is relatively larger than in those genera, so that each upper dental series increases in size from before backwards to the penultimate molar in a more gradual manner.

The skull, when viewed from above, is seen to be broadest between the outer margins of the orbits, and the cranium proper to be so just behind the posterior roots of the zygomata.

The muzzle is longer than the antero-posterior extent of the anterior margin of the wide orbit. The upper surface of the skull is concave between the orbits; there is a more or less marked sagittal ridge; and a rather deep depression exists on each side of the muzzle immediately in front of the lachrymal foramen‡, which last is placed well upon the cheek.

The sphenoidal fissure and the foramen rotundum are together represented by a single opening. There is no carotid foramen in the *basis cranii*; and the malar foramen is very minute. The posterior palatine foramina are small, and there are no defects of ossification on the palate; but the anterior palatine foramina are large. The posterior margin of the palate extends but little backwards, its middle being in a line with the anterior end of the posterior third of the upper penultimate molar. The postglenoid process is large, and behind it is a postglenoidal foramen.

The præmaxilla is (as might be expected from the absence of upper incisors) very small, and quite, or all but, invisible when the skull is viewed in profile; yet it sends up a small process which joins the nasal; and the latter bone is separated, on each side, from the lachrymal by an ascending process of the maxilla. There is no paroccipital process. The mandible has a lofty coronoid process, and the angle is produced downwards as well as backwards.

The dentition may be expressed by the formula:—

$$\text{I.}\ \tfrac{0}{2-2},\ \text{C.}\ \tfrac{1-1}{1-1},\ \text{P.M.}\ \tfrac{3-3}{3-3},\ \text{M.}\ \tfrac{3-3}{3-3},\ =\tfrac{14}{18}=32.$$

The upper canine is very large, with a strongly marked vertical internal groove and a posterior basilar process. The three upper premolars decrease (from before backwards) in vertical extent, but increase in breadth. Each of the first two upper molars consists of two well-marked external cusps, of a very large antero-internal cusp, connected with the postero-external one by an oblique ridge, and of

* Hist. Nat. des Mammifères, p. 170.

† As noticed by Messrs. Schlegel and Pollen, *l. c.* p. 11.

‡ A similar depression exists in *C. milii* and *C. furcifer*, and is relatively deeper and still more sharply defined in *M. minor*.

a rudimentary postero-internal cusp. There is also an external cingulum. Perhaps, however, the molars may be better described as consisting each of three cusps (one internal and two external) connected by ridges, and supplemented externally by a cingulum, and internally, except the last one, by an internal cingulum placed behind the internal cusp and resembling a postero-internal one.

In the lower jaw the incisors and canines have the form and arrangement common in the *Lemuridæ*. The first lower premolar is very large and caniniform, but with a strongly marked process projecting from its anterior margin. The second and third lower premolars are exceedingly like the second lower premolar of *Indris laniger* (see P. Z. S. 1866, p. 157. f. 4). Each has only one external cusp.

The first two lower molars consist each of two internal and two external cusps, with a rudiment of a median fifth posterior cusp. The antero-external cusp is considerably larger than, but not so high as, the antero-internal cusp. The postero-internal cusp is much smaller than the external one.

The last lower molar is nearly similar to the two teeth in front of it; only the fifth cusp has become very large and distinct.

Its tarsal structure is unknown to me; but the tarsus appears to be but little elongated.

As to the affinities of *Lepilemur*, it is, I think, impossible to say that it has any marked relationship to any other genus. Perhaps, as MM. Gervais, Schlegel, and Pollen concur in remarking, it rather approximates to *Hapalemur* than to any other form. The production of the anterior margin of the first lower premolar, as also the form of the two following teeth, recalls to mind (as has been said) the teeth of *Indris laniger*.

The structures exhibited on the one hand by *Lepilemur*, and on the other by *C. furcifer*, render necessary some slight changes in the characters before given of the groups to which they are allied. Thus, if the genus *Lepilemur* is to form part (as I think it must) of the subfamily *Lemurinæ*, it will be necessary to expunge from the characters of that group *the non-inflation of the mastoidal region**, and the characters of *Lepilemur*, *Cheirogaleus*, and *Microcebus* will be as follows:—

LEPILEMUR†.

$$1.\ \tfrac{0}{4},\ C.\ \tfrac{1-1}{1-1},\ P.M.\ \tfrac{3-3}{3-3},\ M.\ \tfrac{3-3}{3-3},\ =\tfrac{14}{18}=32.$$

Tail shorter than the body; muzzle longer than the orbit; first upper premolar more vertically extended than the others; premolars with only one external cusp; last lower molar with a large fifth cusp; præmaxillæ very small; an interparietal bone; palate very short;

* P. Z. S. 1864, pp. 638 & 639.

† Isid. G. St.-Hil. Cat. des Prim. p. 75; Dahlb. Studia Zool. p. 220; Gray, P. Z. S. 1863, p. 144; Wagner, Schreber, Supp. v. p. 147; St. Geo. Mivart, P. Z. S. 1864, pp. 623 & 642; A. Grandidier, Rev. Zool. July 1867, p. 256; Pollen and Schlegel, Rech. sur la Faune de Madagascar, p. 10, pl. 4.

posterior palatine foramina small; a small malar foramen; sphenoidal fissure and foramen rotundum together represented by a single opening; no conspicuous carotid foramen on the basis cranii; angle of mandible produced downwards as well as backwards; mastoidal region of periotic inflated; tarsus short; number of dorsal and lumbar vertebræ ——?

Hab. Madagascar.

1. *L. mustelinus.* From the north-west of Madagascar. Native name "Fitiliki."

2. *L. ruficaudatus**. Native name "Bovenghé."

Cheirogaleus†.

$$\text{I. } \frac{2-2}{4},\ \text{C. } \frac{1-1}{1-1},\ \text{P.M. } \frac{3-3}{3-3},\ \text{M. } \frac{3-3}{3-3},\ = \frac{18}{18} = 36.$$

Upper incisors very unequal, the anterior pair much the larger; third upper premolar very much smaller than the first molar, and with only one external cusp; first upper premolar decidedly, sometimes very greatly, exceeding the second in vertical extent; upper molars with an oblique ridge from the postero-external to the large internal cusp, the postero-internal cusp being very small or absent; fifth cusp of last lower molar obsolete or rudimentary; palate much prolonged beyond the last molars, with no defects of ossification; præmaxillæ largely developed, joining the nasals for more than a quarter of their (the nasals') extent; an interparietal bone; a small malar foramen; carotid foramen conspicuous on *basis cranii*; pterygoid fossæ elongated; ectopterygoid plates subparallel; angle of mandible bent downwards, or not so bent; seven lumbar vertebræ.

Hab. Madagascar.

1. *C. milii*‡. First upper premolar decidedly, but not very greatly, exceeding the second in vertical extent; lower incisors not as long as the mandibular symphysis; angle of mandible not produced downwards; muzzle not much elongated; length of dorsum of naviculare less than half the length of the astragalus; astragalus about two-thirds the length of the os calcis; cuboides somewhat longer than the dorsum of the naviculare.

From the east coast of Madagascar.

2. *C. furcifer*§. First upper premolar exceedingly long, like a shorter second canine; lower incisors as long as the mandibular

* Rev. Zool. July 1867, p. 256.

† Geoff. St.-Hil. Ann. du Mus. d'Hist. Nat. t. xix. p. 171; Isid. G. St.-Hil. Cat. des Prim. p. 76; Wagner, Schreber, Suppl. i. p. 273, and v. p. 147; Dahlb. Studia Zool. p. 221; Gray, P. Z. S. 1863, p. 142; St. Geo. Mivart, P. Z. S. 1864, p. 642.

‡ Geoff. St.-Hil. Cours sur les Mamm. 1828, p. 25; Isid. G. St.-Hil. Cat. des Prim. p. 77; Gray, P. Z. S. 1863, p. 142; St. Geo. Mivart, P. Z. S. 1864, p. 642. *Cheirogaleus typicus*? A. Smith, S. Afr. Journ. ii. p. 50; Gray, P. Z. S. 1863, p. 142.

§ Isid. Geoff. St.-Hilaire, Cat. des Prim. p. 77. *Lepilemur furcifer*, Gray, P. Z. S. 1863, p. 145. *Microcebus furcifer*, St. Geo. Mivart, P. Z. S. 1864, pp. 621 & 642; Pollen and Schlegel, *loc. cit.* p. 8, pl. 5.

symphysis; angle of mandible produced downwards; muzzle elongated; dorsum of naviculare nearly equal in length to the astragalus; astragalus only half the length of the os calcis; cuboides considerably shorter than the dorsum of the naviculare.

From the west of Madagascar. One native name "Walouwy."

3. *C. coquereli**. From the forests of Congony, inside the bay of Passandava. Called by some of the natives "Sietui."

Microcebus†.

$$\text{I.}\ \tfrac{2-2}{4},\ \text{C.}\ \tfrac{1-1}{1-1},\ \text{P.M.}\ \tfrac{3-3}{3-3},\ \text{M.}\ \tfrac{3-3}{3-3},\ =\tfrac{18}{18}=36.$$

Upper incisors unequal, the anterior pair the larger; third upper premolar very much smaller than the first molar, and with only one external cusp; first two upper premolars of subequal vertical extent; upper molars with an oblique ridge from the postero-external to the large internal cusp, the postero-internal cusp being rudimentary or absent; fifth cusp of last lower molar distinct; palate more or less prolonged beyond the last molars; posterior palatine foramina very large; palate with defects of ossification; præmaxillæ largely developed, joining the nasals for more than a quarter of their (the nasals') length; an interparietal bone; no malar foramen; carotid foramen not very conspicuous, but more or less hidden by the eustachian process of the auditory bulla; pterygoid fossæ very short; ectopterygoid plates diverging widely backwards; angle of mandible not bent downwards; seven lumbar vertebræ; tarsus always with the naviculare more elongated than the cuboides.

Hab. Madagascar.

1. *M. pusillus*‡. First pair of upper incisors very slightly larger than the second pair; first upper premolar not quite so extended vertically as the second; defects of ossification in palate very small; snout much produced; profile of anterior nares very concave. Colour bright red-brown.

From the east coast of Madagascar.

2. *M. smithii*§? First upper incisor much larger than the second. Colour pale bay.

3. *M. myoxinus*‖. First upper incisor much larger than the second; first upper premolar quite as vertically extended as the

* Pollen and Schlegel, *loc. cit.* p. 12, pl. 6.

† Geoff. St.-Hil. Cours sur les Mamm. 1828, leç. vi. p. 26; Isid. Geoff. St.-Hil. Cat. des Prim. p. 79, &c.

‡ *Lemur pusillus*, Geoff. St.-Hil. Mag. Encyc. 1796, i. p. 48. *Microcebus rufus*, Geoff. St.-Hil. Cours de l'Hist. Nat. leçon vi. p. 26; Isid. Geoff. St.-Hil. Cat. des Prim. p. 80. *Galago madagascariensis*, Gray, P. Z. S. 1863, p. 149. *M. pusillus*, Waterhouse, Cat. of Mus. of Zool. Soc. 2nd edit. p. 12. no. 89; and St. Geo. Mivart, P. Z. S. 1864, p. 641.

§ *Cheirogaleus smithii*, Gray, Ann. & Mag. N. H. 1842, x. p. 257, and P. Z. S. 1863, p. 143.

‖ Peters, Reise nach Mossambique, p. 14, and St. Geo. Mivart, 1864, p. 640. *Lepilemur myoxinus*, Gray, P. Z. S. 1863, p. 144.

second; defects of ossification in the palate large, one on each side; profile of anterior nares only slightly concave. Colour rusty brown.

From the south-west coast of Madagascar. Native name "Tsitsihi."

4. *M. minor**. First upper incisor much larger than the second; first upper premolar quite as vertically extended as the second; defects of ossification in the palate large, two on each side; profile of anterior nares only slightly concave. Colour grey.

In addition to the foregoing, it may also be remarked that the distinctness of the Galagos from the *Lemurinæ* is somewhat lessened by the discovery of a genus of the latter family (namely *Lepilemur*) in which the mastoidal region of the periotic is inflated, also by the fact that the foot in *Cheirogaleus furcifer* has such an elongated naviculare and os calcis that the length of these bones compared to their breadth differs but little from the proportions in some Galagos. Still the proportion of the cuboides both to the *os calcis* and to the *naviculare* in *C. furcifer* is greater than even in *Galago crassicaudatus*, a species in which the naviculare is relatively less elongated than in the species before selected for comparison with *Microcebus*.

Fig. 6. Fig. 7.

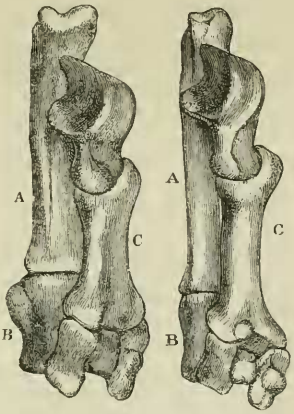


Fig. 6. Tarsus of *C. furcifer*.
7. Tarsus of *G. crassicaudatus*.

A. Calcaneum. B. Cuboides. C. Naviculare. The calcaneum and cuboides are together represented of the same total length, and also of the same length as the tarsi of *Microcebus* and *Galago* formerly figured (P. Z. S. 1864, p. 624).

Moreover, even in *C. furcifer*, the os calcis does not exceed one-third of the length of the tibia, as it appears constantly to do in

* *Galago minor*, Gray, Ann. & Mag. N. H. 1842, x. p. 257. *Lepilemur murinus*, Gray, P. Z. S. 1863, p. 143. *Microcebus minor*, St. Geo. Mivart, P. Z. S. 1864, p. 640.

Galago. I find in *G. crassicaudatus* the dimensions to be as follows:—

	inches.
Length of tibia	3·40
——— of tarsus	1·65
——— of os calcis	1·25
——— of cuboides	0·40
——— from proximal end of os calcis to distal end of cuboides	1·50
——— of astragalus	0·59
——— of dorsum of naviculare	0·71
Least transverse dimensions of both os calcis and naviculare	0·33

I am not disposed to consider the elongated tarsus of *C. furcifer* a sign of any really close affinity between that form and *Galago*; for a still more elongated tarsus distinguishes the genus *Tarsius* (remote enough from either *Cheirogaleus* or *Galago*), and the *Cheirogalei*, so closely allied in other respects, differ greatly in the proportions of this part. Moreover the distinction as to geographical distribution between *Cheirogaleus* and *Galago* is very striking, although it may be remarked that *C. furcifer* is an inhabitant of the *west* coast of Madagascar. Finally, the difference which, according to Dr. Peters, exists in the position of the gall-bladder must not be forgotten.

It is interesting to note the great variation as to tarsal structure exhibited by these nearly allied species from Madagascar, compared with which the differences exhibited by the various species of *Galago* are quite trivial. There are overwhelming reasons for believing that in Madagascar we are near (or at least probably nearer than in any other land now above the sea-level) to the locality where the original forms of the whole suborder Lemuridea first arose. Subsequent modifications, however, such as the exaggerated tarsus now found only in Africa on the one hand, or in Borneo and Celebes on the other, might have arisen in some more or less remote locality. The coexistence, however, of closely allied forms, in Madagascar, differing so much from one another in tarsal structure, seems to me to indicate that this peculiar conformation of the tarsus (unknown in any other group of animals) also took its rise in the same region, and that modified descendants, diverging east and west, there carried still further this remarkable peculiarity, which culminates, and is accompanied by the maximum of lemurine abnormalities, in the most remote region to which any species of the Lemuroidea has, as far as yet known, ever extended.

The inflation of the mastoidal region of the periotic, which causes *Lepilemur* to differ from the other *Lemurinæ*, and assimilates it to *Galago*, is not, I think, a character of any great importance. It exists in the *Nycticebinæ* as well as in *Galago*; and in the genus *Indris* an enlargement above the posterior root of the zygoma (which seems to answer to the mastoidal swelling of *Galago*) is present in *I. laniger*, while it is absent in *I. brevicaudatus**.

* P. Z. S. 1866, p. 160.

Before concluding this paper I wish to call attention to the new and fourth species of *Indris*, lately discovered by M. A. Grandidier*, and described and figured by him, under the name *Propithecus verreauxi*, in a publication entitled 'Album de l'île de la Réunion,' 1866–67. It is from the arid south and south-west coasts of Madagascar, and is called by the natives "Sifak."

A fine specimen of this animal has been recently acquired by the British Museum from Paris. Its anterior teeth (the only ones visible) agree with those of the other *Indrisinæ*, especially with those of *I. diadema*, the anterior pair of upper incisors being considerably larger than the posterior pair. That agreement I fully expect will be found to extend through its whole organization; but before long M. Alphonse Milne-Edwards will supply us with full information on the subject. The more I have of late considered the species of *Indris*, the more I am disposed to think that the great peculiarities of the dentition, the remarkable structure of the carpus (without an os intermedium), and of the pelvis and vertebral column may hereafter be found to accompany other differences, together warranting the elevation of the group to the rank of a distinct family of the Lemuroidea. But on this question we shall be able soon to form a well-grounded judgment, as amongst the treasures lately brought by M. A. Grandidier from Madagascar is a specimen of the group preserved in spirit. It is a matter of congratulation that so interesting an object should have fallen into the able hands it has; and thus a form closely allied to that originally described by Bennett under the name *Propithecus diadema*† will, like *Cryptoprocta ferox* (also originally described and named by the same naturalist‡), receive its full elucidation from the labours of M. Alphonse Milne-Edwards§.

3. On the Australian Genus *Climacteris*, with a Description of a New Species. By John Gould, F.R.S. &c.

Few of the genera constituting the avifauna of Australia are more distinct and remarkable than that named *Climacteris*, the members of which, like the *Certhia familiaris* of our own island, are especially adapted for creeping over the surfaces of large trees; they are, however, as structurally distinct from our well-known Creeper as they are from the *Sittæ* or Nuthatches, of both of which genera no species has yet been found in Australia. Their food principally consists of insects, which they procure among the interstices in the bark of the trees, or on the ground around the base of their boles.

* I have now (February 1868) received letters from M. Alphonse Milne-Edwards and from M. A. Grandidier, informing me of the discovery by the latter gentleman of a new Lemuroid, which has been named by him *Cheirogaleus samati*. The species is remarkable for an immense accumulation of fat in the tail, —recalling to mind the well-known African Sheep.

† P. Z. S. 1832, p. 20.

‡ Trans. Zool. Soc. vol. i. p. 137, pl. 21.

§ Memoir by Messrs. A. Milne-Edwards and A. Grandidier, Ann. des Sc. Nat 1867, vol. vii. series 5, p. 321.

The species are:—

CLIMACTERIS SCANDENS.

Generally distributed over the south-eastern portions of Australia.

CLIMACTERIS RUFA.

Inhabits the neighbourhood of Swan River, Western Australia.

CLIMACTERIS ERYTHROPS.

The interior of New South Wales.

CLIMACTERIS MELANOTA.

The Gulf of Carpentaria.

CLIMACTERIS MELANURA.

The north coast of Australia.

CLIMACTERIS LEUCOPHÆA.

New South Wales.

Thus every colony of that vast country, with the exception of Tasmania, is inhabited by a species of this singular form. When I commenced the study of the Australian birds, now nearly thirty years ago, only two species were known, namely *C. scandens* and *C. leucophæa*. In the interval the four others above named have been discovered; and I now give the description of a fifth, from a skin sent to me two years since by Mr. E. P. Ramsay of Dobroyde, in New South Wales, and which I should have characterized earlier, but for an impression that it was an example of *C. leucophæa* in an abnormal state of plumage; I now venture to do so in consequence of a second inquiry from Mr. Ramsay as to what I have called the red-rumped *Climacteris*.

The name I propose for it is

CLIMACTERIS PYRRHONOTA.

Crown, forehead, and wings brown, the feathers of the former edged with a lighter tint of the same colour; some longitudinal tear-drop-like streaks of buffy white on the scapularies; wings crossed by a band of light buff; rump and upper tail-coverts rust-red, forming a conspicuous mark; throat and chest white; on the hinder part of the cheeks a patch of rust-red; centre of the abdomen buffy white; flanks deep brown, with the centre of each feather greyish white; under tail-coverts fawn-white, each feather crossed by two irregular lines of black; tail grey, the five outer feathers on each side centred with black and tipped with greyish white.

Total length $5\frac{1}{2}$ inches, bill $\frac{3}{4}$, wing $3\frac{3}{5}$, tail $2\frac{1}{2}$, tarsi $\frac{3}{4}$.

In favour of its being distinct, I may remark, first, that I found the *C. leucophæa* very common in New South Wales, and killed many examples of both sexes without finding a trace of red on their rump-feathers; secondly, that we rarely find rust-red to be the precursor of the fine blue-grey of a subsequent change; and thirdly, that rust-red is a prevailing tint in some of the other species of the genus. It assimilates in size and general appearance (except in the

rust-red of the lower part of the back, rump, and upper tail-coverts) to the female of *C. leucophæa*, even to the rusty spot on the cheeks.

Mr. Ramsay's specimen has "Springfield, Jan. 1, 1865," marked on the label attached to it.

An apparently immature example of this bird is in the collection at the British Museum.

4. List of Birds collected at Pebas, Upper Amazons, by Mr. John Hauxwell, with Notes and Descriptions of New Species. By P. L. Sclater, M.A., Ph.D., F.R.S., and Osbert Salvin, M.A., F.Z.S.

(Plate XLV.)

After several years of inaction as regards zoological pursuits, Mr. Hauxwell has again transmitted to this country one of his beautifully prepared series of bird-skins from the Upper Amazons. Having been recently engaged on Mr. Bartlett's collections from the same neighbourhood, it has been of great interest to us to examine Mr. Hauxwell's series, which embraces examples of 135 species. These are all from the vicinity of Pebas, a town situated on the north bank of the main Amazons, some way below the mouth of the Napo. Four of them appear to be new to science, namely *Oryzoborus melas*, *Tyranniscus gracilipes*, *Percnostola fortis*, and *Porzana fasciata*.

The following is a complete list of the species, the nomenclature adopted, where no additional reference is given, being that of Sclater's 'American Catalogue,' except in the case of the *Trochilidæ*, which have been determined by Mr. Gould, and are named according to the catalogue in the Introduction to his Monograph of that family:—

Troglodytidæ.

1. *Microcerculus marginatus.*
2. *Thryothorus coraya.*

Hirundinidæ.

3. †*Hirundo æquatorialis.*

Vireonidæ.

4. *Vireosylvia agilis.*

Cœrebidæ.

5. *Dacnis cayana.*
6. —— *melanotis.*
7. —— *flaviventris.*
8. *Chlorophanes atricapilla.*
9. *Cœreba cærulea.*
10. —— *nitida.*

Tanagridæ.

11. *Procnias occidentalis.*
12. *Euphonia melanura.*
13. —— *rufiventris.*
14. *Calliste yeni.*
15. —— *schranki.*
16. —— *xanthogastra.*
17. —— *boliviana.*
18. *Ramphocœlus jacapa.*
19. —— *nigrogularis.*
20. *Tachyphonus cristatellus.*
21. *Nemosia pileata.*
22. *Saltator magnus.*
23. —— *azaræ.*
24. *Cissopis media.*

Fringillidæ.

25. †*Oryzoborus melas*, sp. nov.
26. —— *torridus.*
27. *Spermophila castaneiventris.*
28. *Coturniculus peruanus.*

ICTERIDÆ.

29. *Ostinops cristatus.*
30. *Cassiculus solitarius.*
31. *Xanthosomus icterocephalus.*
32. *Cassidix oryzivora.*

CORVIDÆ.

33. *Cyanocorax violaceus.*

DENDROCOLAPTIDÆ.

34. *Furnarius torridus* (?)*.
35. *Leptoxyura cinnamomea.*
36. *Philydor pyrrhodes.*
37. *Dendrornis ocellata*‡.

FORMICARIIDÆ.

38. *Cymbilanius lineatus.*
39. *Thamnophilus melanurus.*
40. —— *radiatus.*
41. *Dysithamnus schistaceus*§.
42. *Cercomacra cinerascens*‖.
43. †*Percnostola fortis*, sp. n.
44. †*Myrmelastes plumbeus.*
45. *Myrmotherula cinereiventris*¶.
46. —— *axillaris.*
47. —— *pygmæa.*
48. *Hypocnemis cantator.*
49. —— *myiotherina***.
50. *Grallaria brevicauda.*

TYRANNIDÆ.

51. *Fluvicola albiventris.*
52. *Arundinicola leucocephala.*
53. *Todirostrum maculatum.*
54. *Mionectes oleagineus.*
55. †*Tyranniscus gracilipes*, sp.n.
56. *Tyrannulus elatus.*
57. *Elainea pagana.*
58. —— *caniceps.*
59. ——, sp. ign.
60. *Myiozetetes cayennensis.*
61. *Pitangus sulphuratus.*
62. *Rhynchocyclus megacephalus.*
63. ——, sp. ign.
64. *Myiodynastes solitarius.*
65. †*Muscivora castelnaudi.*
66. *Pyrocephalus rubineus.*
67. †*Empidochanes fuscatus.*
68. *Myiarchus*, sp. ign.
69. *Tyrannus melancholicus.*
70. *Milvulus tyrannus.*

COTINGIDÆ.

71. *Pachyramphus niger.*
72. —— *atricapillus.*
73. *Pipra auricapilla.*
74. —— *cyaneocapilla.*
75. *Machæropterus striolatus.*
76. *Chiromachæris manacus.*
77. *Phœnicocercus nigrigularis.*
78. *Cotinga cayana.*

ALCEDINIDÆ.

79. *Ceryle torquata.*
80. —— *amazona.*
81. —— *americana.*
82. —— *superciliosa.*

GALBULIDÆ.

83. *Galbula tombacea.*
84. —— *leucogastra.*
85. *Brachygalba inornata.*
86. *Galbalcyrhynchus leucotis.*

BUCCONIDÆ.

87. *Monasa nigrifrons.*

TROGONIDÆ.

88. *Trogon melanurus.*

CAPRIMULGIDÆ.

89. *Podager nacunda.*
90. *Nyctidromus albicollis*‡‡.
91. *Hydropsalis trifurcata*§§.

* See Scl. & Salv. P. Z. S. 1866, p. 183.
§ See *anteà*, p. 756.
¶ See *anteà*, p. 756.
‡‡ See Sclater, P. Z. S. 1866, p. 144.
§§ Cf. Sclater, P. Z. S. 1866, p. 141.
‡ See *anteà*, p. 575.
‖ See P. Z. S. 1866, p. 186.
** See *anteà*, p. 757.

TROCHILIDÆ.

92. *Glaucis affinis.*
93. *Threnetes cervinicauda.*
94. *Phaëthornis oseryi.*
95. —— *malaris.*
96. —— *nigricinctus.*
97. *Campylopterus æquatorialis.*
†98. *Lampornis mango.*
99. *Iolæma schreibersi.*
100. *Thalurania nigrofasciata.*
101. *Florisuga mellivora.*
102. *Polemistria verreauxi.*
103. *Gouldia langsdorfi.*
104. *Heliothrix auritus.*
105. *Clytolæma aurescens.*
†106. *Heliomaster longirostris.*
107. *Leucippus chlorocercus*.*
108. *Thaumantias fluviatilis.*
109. *Chrysuronia josephinæ.*
110. *Eucephala cærulea.*
111. *Hylocharis sapphirina.*
112. *Chlorostilbon napensis.*

CUCULIDÆ.

113. *Piaya melheri.*
114. —— *rutila.*
115. *Coccyzus melanocoryphus.*

CAPITONIDÆ.

† 116. *Capito amazonicus.*

PICIDÆ.

117. *Chrysoptilus speciosus.*

PSITTACIDÆ.

118. *Ara severa.*
119. *Brotogerys xanthopterus.*

ACCIPITRES.

120. *Ibycter ater* (Vieill.).
121. *Urubitinga schistacea* (Sund.).
122. *Harpagus bidentatus* (Lath.).
123. *Gampsonyx swainsoni*, Vig.

HERODIONES.

124. *Ardea cocoi* (Linn.).
125. *Nycticorax pileatus* (Lath.).
126. *Tigrisoma brasiliense* (Linn.).

RALLI.

127. *Eurypyga helias* (Pall.).
128. †*Porzana fasciata*, sp. n.
129. *Heliornis fulica* (Bodd.).

LIMICOLÆ.

130. *Hoplopterus cayanus* (Lath.).
131. *Actiturus bartramius* (Wils.).
132. *Tringites rufescens* (Vieill.).
133. *Totanus solitarius* (Wils.).

LARIDÆ.

134. *Sterna magnirostris*, Spix.

ANSERES.

135. *Cairina moschata* (Linn.).

The following notes refer to the species marked with an †.

3. HIRUNDO ÆQUATORIALIS, Lawr. Ann. L. N. Y. viii. p. 400.

Several examples of this form of *H. albiventris* are in the collection. As far as we can tell from specimens before us, it appears to be readily distinguishable. We should doubt, however, whether it really occurs near Quito, as stated by Mr. Lawrence.

—25. ORYZOBORUS MELAS, sp. nov.

Nitenti-niger: speculo alari, tectricibus subalaribus et rectricum duarum mediarum macula basali albis: rostro albo: pedibus fuscis: long. tota 6 poll. Angl., alæ 2·7, caudæ 2·4. ♀. Cinerascenti-fusca, subtus fulvescentior, gula albicante: rostro et pedibus fuscis.

Hab. in Peruv. orient. Pebas (*Hauxwell*).

* Cf. Gould, P. Z. S. 1866, p. 194.

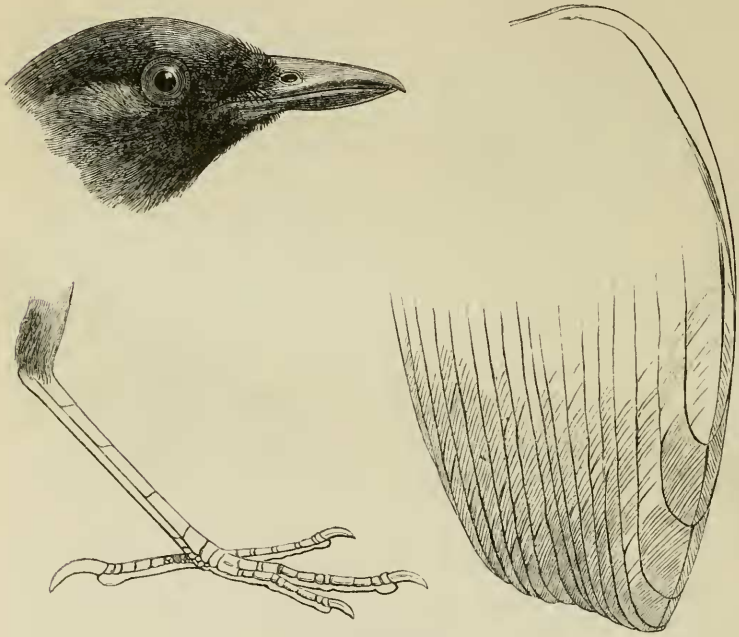
Obs. Affinis *O. crassirostri*, sed rostro multo minus crasso; crissi plumis intus non albo notatis et speculo alari latiore.

†43. PERCNOSTOLA FORTIS, sp. nov. (Pl. XLV.)

Nigricanti-cinerea, fere unicolor, pileo subcristato et corpore subtus ad medium pectus nigris: campterio alari albo: long. tota 7·3, alæ 3·3, caudæ 2·7, tarsi 1·4, *rostri a rictu* 1·15. ♀. *Obscure cinerea, pileo alis et cauda extus ferrugineis, dorso et hypochondriis fulvescentibus: campterio albicante.*

Hab. in Peruvia orient. Pebas (*Hauxwell*); Chyavetas (*Bartl.*).

Obs. Forma et habitu *P. funebri* affinis, sed differt statura majore et alis extus immaculatis.



Percnostola fortis.

Two skins, those of an adult male and young male, of this species are in the collection, and have enabled us to make out the female of this species which was in Bartlett's last collection, and which we were previously unable to determine. The form is more nearly that of *Percnostola funebris* than any other bird of the group with which we are acquainted, but it is larger and stronger. The wings are short and rounded, the fourth, fifth, sixth, seventh, and eighth primaries being nearly equal, and forming the wing-end. The tarsi are not quite so strong as in typical *Thamnophili*, and are proportionally longer.

44. Myrmelastes plumbeus.

Recent researches have convinced us that Gould's *Thamnophilus hyperythrus* is the female of this species. As, however, the term *hyperythrus* is only applicable to one sex, it will be more convenient to use the more recent name. A pair of this species are in the present collection, procured on the same day, and with the sex of each marked.

+55. Tyranniscus gracilipes, sp. nov.

Tyranniscus gracilipes, Sclater, MS.

Olivaceus, pileo obscure cinereo : loris albidis : alis nigris, secundariis et tectricibus flavo marginatis : cauda nigricante, olivaceo extus marginata : subtus pallide flavus : rostro nigricante, pedibus plumbeis : long. tota 4·3, *alæ* 2, *caudæ* 1·9, *tarsi* ·55.

Hab. in Peruv. orient. Pebas (*Hauxwell*).

Three specimens of this species agree with an indifferent skin in Sclater's collection (No. 1317 of his 'American Catalogue'), said to be from Venezuela. Two of them are somewhat shorter in the wing than the described specimen, which is marked *male*. The nearest described species seems to be *T. parvus*, Lawrence (Ibis, 1862, p. 12), which is of about the same size, but has the throat and breast white.

65. Muscivora castelnaudi.

Onychorhynchus castelnaudi, Deville, R. Z. 1849, p. 57.

A single specimen of this bird is in the collection, but does not appear quite adult. It presents some of the distinctive characters pointed out by M. Deville ; but we should prefer to see further specimens before guaranteeing the species as distinct from *M. regia*.

+128. Porzana fasciata, sp. nov.

Corethrura, sp., Scl. & Salv. P. Z. S. 1866, p. 200.

Castanea : dorso et alis extus brunnescenti-olivaceis : ventre toto cum hypochondriis et subalaribus nigro transfasciatis : rostro nigro, pedibus rubellis : long. tota 6·8, *alæ* 3·8, *caudæ* ·9, *tarsi* 1·6, *rostri a rictu* ·9.

Hab. Peruvia orient. Pebas et Chamicurros (*Hauxwell*); fl. Ucayali (*Bartlett*).

Obs. Similis *P. castaneæ*, Cuv., sed ventre fasciato diversa.

A single specimen of this Rail was in Mr. Bartlett's Ucayali collection and is now in the British Museum. In the same collection is a second example, obtained some years ago by Mr. Hauxwell at Chamicurros.

The species appears to be unnamed, but it is a very distinct one, and belongs to the group *Rufirallus* of Bonaparte. We propose to give a figure of it in a forthcoming number of our 'Exotic Ornithology.'

5. On Peruvian Birds collected by Mr. H. Whitely. By P. L. Sclater, M.A., Ph.D., F.R.S., and Osbert Salvin, F.Z.S.—Part I.

(Plate XLVI.)

The present paper contains an account of the first collection of birds formed by Mr. Henry Whiteley, junior, during his new expedition to South-western Peru.

The following are extracts from several of Mr. Whitely's letters, relating to his journey and the countries visited:—

(Letter I., Islay.) "I left Southampton April 2nd of the present year, and, after a fine voyage, arrived at Islay, *viâ* Panama, on the evening of the 6th of May. I went out on the following day and shot my first bird in Peru, which in habits was very similar to our Wheatear*. In a few days I intend to make some excursions to the hills after Humming-birds, as the Gulls and Terns are all away from here at this season. From the residents of Islay I have received the greatest kindness and assistance.

"I have made two trips to the 'Lomas.' These 'Lomas' are hills about six miles from Islay. Between them are valleys in which there are running streams of water. In these valleys there is plenty of vegetation, small flowering shrubs, fir trees, olive-trees, &c., which are frequented by numerous species of birds. Here also I obtained nearly all the specimens of Humming-birds sent in the first collection."

(Letter II., Arequipa.) "I left Islay for Arequipa at 12 A.M. on the 19th, being accompanied part of the way by some good friends from Islay. We parted company at a house on the hills, and I then went on with my guide. I had two horses with me for the journey. My luggage will be sent up on mules.

"After making a gradual ascent up the hill for about 3000 feet, we came to a large plain, which extends for about forty-five miles. As soon as you get on this plain you can see the volcano of Arequipa, which is covered with snow at the top—and also some of the high peaks of the Andes, which are also covered with snow.

"In the centre of the plain there is a very respectable sort of an inn, kept by an Englishman. We arrived here at 6 o'clock in the evening; I had some refreshments, and then went to bed and slept five hours, and left the inn at half-past one in the morning. We galloped along the plain until we got to the foot of the hills, which we reached at half-past three A.M. I then slept until six o'clock, and started for Arequipa. In the plain there are some most peculiar mounds of sand in the shape of a horseshoe, which must have been blown from a considerable distance, as there is no sand of the same colour anywhere on the plains. The colour of the sand on the mounds is a dark lead, whilst the sand of the plains is of a reddish colour.

"After ascending and descending several times, we at last caught

* It was *Muscisaxicola mentalis* (Lafr. et D'Orb.).—P. L. S.

a glimpse of Arequipa. What a glorious sight it was, with its white stone houses, and the green fields extending for miles round the city. Arequipa is 7800 feet above the sea, and a distance of ninety miles from Islay. The journey took me twenty-four hours, and I was rather tired when I arrived."

(Letter IV., Arequipa.) "On the 15th of July Mr. Gibson and myself started for a trip to Salinas, a salt-lake at an elevation of 14,000 feet. We had three servants with us and two pack-mules. At some distance from Islay we commenced to ascend, and arrived the first day at the village of Chihuata, at an elevation of 9000 feet. Here we were hospitably received in the house of one of the residents, and slept the night. The next morning we started early; and now commenced the worst part of the journey, the road being a gradual ascent of mountains for 5300 feet. The way, however, was enlivened by the sight of numerous birds, and especially, for some 2000 feet, by the movements of the Giant Humming-bird (*Patagona gigas*).

"On arriving at the highest part of our journey, a glorious sight burst on our view, the volcano being in active eruption, and vast volumes of smoke coming up from the crater and spreading over the country. We had now to descend about 300 feet, and came upon the lake, which was nearly all dried up, and was quite dazzling to the sight, the whole surface being covered with layers of salt. After a ride of about six miles round the lake, we came to some Indian huts, and also a small chapel, where we intended to sleep. By this time it was getting dark and very cold. The next day we had some shooting, and got some Ducks and also three Flamingos, but unfortunately they had the hind toe*. I will not trouble you with all details; it is sufficient to say we shot altogether ninety-five birds, out of which I selected the best for preserving.

"We stayed here two days, and then returned to Chihuata, slept there the night, and the next morning I was out early and shot a large Humming-bird (*Patagona gigas*), the dark one with the patch of green upon the throat (*Metallura cupreicauda*), and the one with the green throat and chestnut patch on the belly (*Oreotrochilus estella*). We returned the same day to Arequipa."

The specimens of birds collected by Mr. Whitely at Islay and Arequipa and during the above-mentioned excursion to Salinas belong to fifty-eight species, of which a list is subjoined. Although mostly species of great interest and some rarity, there is little actually new to science amongst them.

They are mostly species described in D'Orbigny's well-known 'Voyage,' and in Tschudi's 'Fauna Peruana.' Many Chilian species also extend thus far north; and the general aspect of the avifauna of Western Peru is decidedly Chilian, having no features in common with the eastern wood-region of Peru. We reserve, however, our general remarks on this subject until the receipt of further collections, which will give us more materials for forming a judgment on it.

* I had particularly requested Mr. Whitely to look out for *Phœnicopterus andinus*, which has no hind toe.—P. L. S.

1. TURDUS CHIGUANCO, D'Orb. et Lafr.

Islay and Arequipa, May and June, several specimens varying a little in size. "Bill bright yellow; eye reddish hazel; legs, toes, and claws bright yellow."

2. TROGLODYTES TESSELLATUS, Lafr. et D'Orb. Mag. de Zool. 1836, p. 25; D'Orb. Voy. Ois. p. 232.

Arequipa, several examples.

3. ANTHUS RUFUS (Gm.); Baird, Rev. A. B. i. p. 156.

Two specimens from Islay.

4. HIRUNDO ANDICOLA, Lafr. et D'Orb. Syn. Av. in Mag. de Zool. 1837, p. 69.

Two examples from Arequipa, May. These skins are the first we have seen of this distinct species. The feet are proportionally small, and the middle toe adheres to the outer fully to the end of the basal joint. The nostrils are lateral, and partially overhung. The tarsi are quite nude. The tail is very nearly square, the middle rectrices being barely shorter than the outer. The species does not appear to fit any of the subdivisions given by Baird, R. A. B. p. 271.

5. ATTICORA CYANOLEUCA (Vieill.); Baird, R. A. B. p. 310.

Petrochelidon cyanoleuca, Sclater, Cat. A. B. p. 40.

Two specimens of this widely distributed species from Arequipa.

6. CONIROSTRUM CINEREUM, D'Orb. et Lafr. Mag. de Zool. 1838, p. 25; D'Orb. Voy. Ois. p. 374, t. 59. f. 1; Cassin, Pr. Acad. Phil. 1864, p. 272.

Arequipa, many specimens of both sexes. The females are of a browner and more olivaceous tinge. The bird figured by D'Orbigny appears to be a male. We cannot quite agree with Mr. Cassin in considering Sclater's *C. fraseri* identical with this bird. *C. fraseri* has the superciliaries and body below of a pale rufous, and the head is much darker. But the two species are certainly near allies. The irides of this species are noted "dark hazel."

7. DIGLOSSA BRUNNEIVENTRIS, Lafr. Rev. Zool. 1846, p. 318; Des Murs, Icon. Orn. t. 43; Cassin, Proc. Acad. Ph. 1864, p. 274.

Chihuata, alt. 9000 feet; one example, July 1867, marked male. See Sclater's remarks upon Des Murs's incorrect locality for this bird, *antea*, p. 322.

8. TANAGRA DARWINI, Bp.

Several examples of this species from Arequipa. "Eyes pinkish hazel."

9. PHEUCTICUS CHRYSOGASTER (Less.).

Two examples, from Arequipa and Islay (May and June), apparently immature male and female, of this species.

10. Phrygilus atriceps (Lafr. et D'Orb.).

One example from Chihuata, in the plumage figured by D'Orbigny, but marked *female*.

11. Phrygilus fruticeti, Kittl.

Specimens of both sexes of this species, from Chihuata and Arequipa. D'Orbigny has already recorded its occurrence in La Paz under the name *Emberiza luctuosa* (Syn. Av. in Mag. de Zool. 1837, p. 80).

12. Phrygilus alaudinus (Kittl.).

Several specimens from Islay and Arequipa (May and June), with the head striated, as in the female, perhaps a seasonal variation. "Bill yellowish brown; eyes dark brown; legs and toes light chrome-yellow."

13. Phrygilus speculifer (Lafr. et D'Orb.).

Diuca speculifera, Sclater, C. A. B. p. 111.

Four specimens from Salinas. "Eye dark hazel."

14. Zonotrichia pileata (Bodd.).

Many specimens from Islay and Arequipa.

† 15. Chrysomitris capitalis, Cab. J. f. Orn. 1866, p. 160.

Many examples (from Islay and Arequipa) of this western form of *C. icterica*, agreeing with Sclater's examples from Ecuador.

16. Sturnella bellicosa, De Filippi.

Many specimens from Arequipa. MM. Philippi and Landbeck have lately redescribed this bird as *Leistes albipes* (Wiegm. Arch. 1863, p. 128).

17. Geositta cunicularia (Vieill.).

Islay, May. Two examples, agreeing with specimens from Chili.

18. Cinclodes fuscus (Vieill.).

A single skin of this species from Chihuata, rather whiter below than others in Sclater's collection, but not otherwise different. A skin, belonging to the Smithsonian Institution, from Conchitas, Buenos Ayres, is also undistinguishable, which shows that Azara's bird is the same.

19. Cinclodes nigrifumosus (Lafr. et D'Orb.).

Two specimens from Islay, September. "Eye dark hazel."

20. Synallaxis ægithaloides (Kittl.).

Two examples from Islay. "Legs and toes black; bill black; eye dark hazel."

21. SYNALLAXIS ORBIGNII (Reich.).

Synallaxis humicola, Lafr. et D'Orb. Mag. de Zool. 1836, p. 24; D'Orb. Voy. Ois. p. 245, t. 17. f. 2.

Bathmidurus d'orbignyi, Reich. H. d. Sp. Orn. p. 163.

Synallaxis crassirostris, Landb. J. f. O. 1865, p. 401.

This species has been wrongly referred by Lafresnaye and D'Orbigny to the *S. humicola* of Kittlitz. It is readily distinguishable on comparison by its thicker bill, rufous throat-spot, and the clear rufous colour of the outer webs of the external tail-feathers. D'Orbigny's specimens were from the ravine of Palca, Western Bolivia. Those described by Landbeck as *S. crassirostris* were obtained by Leybold in the vicinity of Mendoza. Mr. Whitely sends us two examples from Arequipa. Sexes (as marked) alike.

22. OCTHOËCA LEUCOPHRYS.

Fluvicola leucophrys, Lafr. et D'Orb. Syn. Av. in Mag. de Zool. 1837, p. 60; D'Orb. Voy. p. 345, t. 38. f. 1.

Octhoëca leucophrys, Sclater, P. Z. S. 1856, p. 28; Cab. et Hein. Mus. Hein. ii. p. 48.

Two examples of this fine species from Islay and Chilnata. "Eyes dark hazel; bill and feet black." In Sclater's 'Catalogue' *Fluvicola leucophrys* is wrongly referred to a very different bird—the *Tyrannula setophagoides* of Bonaparte.

23. MUSCISAXICOLA ALBIFRONS.

Ptyonura albifrons, Tsch. F. P. p. 167, t. 12. f. 2.

Muscisaxicola albifrons, Ph. et Landb. Wiegm. Arch. 1865, p. 78.

One example of this bird from Salinas shows that Sclater has been in error in uniting it to *Tænioptera alpina*, Jard., of Ecuador*. The present species is much larger in size, in fact the giant of the genus†. The upper coloration is also paler, and the head slightly rufescent, instead of being darker than the back. The front is white in *M. albifrons*, which is not the case in *M. alpina*; and the outer webs of the outer tail-feathers are distinctly edged with white. The species from Ecuador will therefore stand as *M. alpina* (Jard.). The eyes of *M. albifrons* are noted as "dark hazel."

24. MUSCISAXICOLA MENTALIS (Lafr. et D'Orb.).

Skins from Islay. "Female: eye dark hazel; legs, toes, and claws black."

25. MUSCISAXICOLA RUBRICAPILLA, Ph. et Landb. (Pl. XLVI.)

Muscisaxicola albilora, Lafr. Rev. Zool. 1855, p. 60 (?).

Muscisaxicola rubricapilla, Ph. et Landb. Wiegm. Arch. 1865, p. 90; Sclater, Ibis, 1866, p. 58.

Supra fuscescenti-cinerea, loris et regione oculari albescentibus;

* See P. Z. S. 1860, p. 78, and Ibis, 1866, p. 57.

† *M. albifrons*: long. tota 9·0, alæ 6·0, caudæ 3·8.
M. alpina: „ 6·8, „ 5·0, „ 3·1.

vertice obscure rubro : alis extus dorso concoloribus, remigibus obscurioribus : caudæ tectricibus superioribus fuliginosis : cauda nigra, rectricibus duabus externis albo extus marginatis : subtus grisescenti-alba fere unicolor ; tectricibus subalaribus albis : rostro et pedibus nigris : long. tota 7·0, *alæ* 4·6, *caudæ* 3·1, *tarsi* 1·15, *rostri a rictu* 0·8.

Hab. in mont. Peruviæ occident. merid. et reipubl. Chilensis.

Two examples of this species of *Muscisaxicola* were obtained at Salinas in July 1867. The eye is noted as "dark hazel." The species is nearly related to *M. rufivertex* of Lafresnaye, but is evidently distinct, and forms a second species of the red-head section. See Sclater's synopsis of the genus, 'Ibis,' 1866, p. 57.

We are inclined to consider that Lafresnaye's *M. albilora* is probably identical with this species.

26. Centrites niger (Bodd.).

One example, male, from Salinas. "Eyes dark hazel."

27. Pyrocephalus rubineus (Bodd.).

Several specimens, obtained in the Catarindos valley, a little south of Islay. These are quite as large as some eastern examples of *P. rubineus*, and induce us to believe that the supposed western form *P. nanus* is not really different.

28. Anæretes albocristatus (Vig.).

Two examples from Arequipa, agreeing well with D'Orbigny's figure of *Culicivora reguloides*. Eyes marked "dark hazel."

29. Antrostomus æquicaudatus (Peale); Sclater, P. Z. S. 1867, p. 342.

A single skin of this species from Islay, obtained September 13th.

30. Oreotrochilus estellæ (D'Orb. et Lafr.); Gould, Mon. ii. t. 70.

One example from Chihuata, alt. 9000 feet, July 19th, ♂.

31. Myrtis francescæ (Less.); Gould, Mon. iii. t. 151.

Two examples, a female and a young male, from Islay.

32. Thaumastura coræ (Less.); Gould, Mon. iii. t. 153.

Many specimens from Islay and Arequipa.

33. Rhodopis vesper (Less.).

Many examples from Islay and Arequipa, and two from Chihuata. Eyes in one marked "dark hazel."

34. Mettallura cupreicauda, Gould, Mon. iii. t. 191.

Two specimens of this fine species, from Chihuata (alt. 9000 feet). "Eyes dark hazel."

35. Petasophora iolata, Gould, Mon. iv. t. 226.

A young bird, probably referable to this species, from Arequipa.

36. Patagona gigas (Vieill.); Gould, Mon. iv. t. 232.

Three skins from Arequipa.

37. Conurus aurifrons (Less.).

One example from Chihuata, of a nearly uniform green, apparently a young female of this species.

† 38. Cathartes aura.

Arequipa, one skin. "Eyes white."

39. Milvago megalopterus, Meyen.

Adult and young bird in change, of this species, agreeing well with D'Orbigny's figure and description of *Phalcobænus montanus*. We have compared them with Chilian specimens alluded to by Sclater (*anteà*, p. 329), and cannot distinguish them in any way. The points of distinction given by Von Pelzeln between his proposed new species *M. crassirostris* and *M. montanus* are very slight, and they do not appear to hold good with our specimens. For example, in Mr. Whitely's adult specimen the first primary is decidedly shorter than the sixth. This is given by Von Pelzeln as a distinguishing characteristic of the Chilian "*M. crassirostris*."

40. Buteo erythronotus (King).

One skin in the immature plumage, called by Gould *Buteo varius*, from Arequipa. "Female, eyes white."

† 41. Hypotriorchis femoralis (Temm.).

Arequipa, a single female. "Eyes dark hazel."

42. Tinnunculus sparverius (Linn.).

Arequipa, one skin belonging to the variety without the red patch on the crown. "Eyes chocolate-colour."

43. Circus poliopterus, Tsch. F. P. *Aves*, p. 113, t. 3; Schlegel, Mus. d. P.-B. *Circi*, p. 6.

A single skin of an adult female. "Eyes bright yellow." Obtained near Arequipa. Schlegel (Mus. de P.-B. *Circi*, p. 6) suggests that *C. megaspilus*, Gould, may be the young of this species; but by a recent inspection of the type specimen in the British Museum we have ascertained that such is not the case, and that *C. megaspilus* is a long-winged bird, probably referable to the young dress of the *C. macropterus*.

† 44. Strix perlata, Vieill.

Arequipa. "Eyes dark hazel, nearly black."

45. PHOLEOPTYNX CUNICULARIA (Mol.).

Catarindos valley. "Eye light yellow."

46. GLAUCIDIUM INFUSCATUM (Temm.).

Arequipa, one specimen, marked *female*.

47. ZENAIDA AURICULATA, Gray; Bp. Consp. ii. p. 82.

A single example from Arequipa, marked "male: eyes dark brown."

48. METRIOPELIA AYMARA, Knip et Prev.; Bp. Consp. ii. p. 76.

One skin of this scarce species, from Salinas.

49. CHAMÆPELIA ERYTHROTHORAX (Meyen).

Two specimens from Arequipa. "Eyes dark blue." We believe that this species, which has been hitherto called *Chamæpelia anais* (Less.)*, has an older name in *Columba erythrothorax*, Meyen, Acta Leopoldino-Car. vol. xvi. Suppl. p. 98, t. 16 (*Chamæpelia monticola*, Tsch. F. P. pp. 45, 276; *Columbula erythrothorax*, Bp. ii. p. 80). The only discrepancy to be discovered is that Meyen's figure does not show the naked eye. Meyen's specimen is stated to have been obtained from the Andes above Arequipa.

50. CHAMÆPELIA CRUZIANA (Knip et Prev.); Sclater, P. Z. S. 1866, p. 100.

Columbula cruziana, Bp. Consp. ii. p. 80.

Several examples of both sexes from Arequipa.

51. TINAMOTIS PENTLANDI, Vigors, P. Z. S. 1836, p. 79; Gray & Mitch. Gen. of B. t. 138.

One skin of this remarkable bird from Arequipa.

52. OREOPHILUS RUFICOLLIS (Wagl.).

Charadrius ruficollis, Wagler, Isis, 1829, p. 653.
Oreophilus totanirostris, Jard. & Selb. Ill. Orn. iii. p. 151.

A single male specimen in adult plumage, from Islay.

53. THINOCORUS RUMICIVORUS, Eschscholtz.

A specimen of this bird from Islay is much smaller in dimensions than Chilian and Argentine examples, and agrees in this respect with a skin recently received by Sclater from Lima (Prof. Nation). It is also rather paler in colouring.

54. THINOCORUS ORBIGNYANUS, Geoffr. et Less. Cent. Zool. p. 137, t. 48, 49.

Three examples of this species, from Salinas. Eyes of male specimen marked "dark hazel."

* Cf. Sclater, P. Z. S. 1866, p. 100.

Tschudi has described a *Thinocorus ingæ* (Av. Consp. p. 387, et Faun. Per. pp. 48, 279), from the highlands of Peru, which we believe to be the same as the present species. We are not able to distinguish Mr. Whitely's skins from other examples from Chili and La Plata. Tschudi lays stress upon the presence of a black breast-band in his *T. ingæ*; but this band is also present in southern specimens. He also states that the white throat is peculiar to *T. d'orbignyanus*; but this is also present in one of Mr. Whitely's specimens.

55. RALLUS RYTHIRHYNCHUS, Vieill.

Rallus rythirhynchus, Vieill. N. D. xiii. p. 521, et E. M. p. 1060 (ex Azara, sp. 372).

Aramides rythorhynchus, Burm. La Plata-Reise, ii. p. 504.

Rallus cæsius, Tsch. F. P. *Aves*, pp. 52, 301; Schlegel, Mus. d. P.-B., *Ralli*, p. 8; Cassin, Gilliss's Exp. ii. p. 194.

Rallus sanguinolentus, Sw. An. in Men. p. 335; Bridges, P. Z. S. 1843, p. 118; Darwin, Zool. Voy. Beagle, iii. p. 133; Sclater, P. Z. S. 1867, p. 333.

Rallus bicolor, Guy, Faun. Chil. *Aves*, p. 434.

Aramides zelebori, Pelzeln, Novara-Reise, Vög. p. 133 (?).

After comparing Mr. Whitely's example of this Rail with specimens of *Rallus sanguinolentus* of Chili, and skins of the *Rallus rythirhynchus* of Buenos Ayres, we have come to the conclusion that they all belong to one rather variable species. The present example is shorter-billed than Mr. Salvin's specimen from Leybold, alluded to P. Z. S. 1867, p. 333. We suspect that Von Pelzeln's *A. zelebori* is the same species from Southern Brazil.

Rallus rythirhynchus must, however, be carefully distinguished from *R. nigricans* (= *R. cæsius*), with which some authors have confounded it, being at once recognizable by its incurved bill and the red spot at the base of the lower mandible.

56. ANAS CRISTATA (Gm.).

Anas pyrrhogaster, Meyen, Nov. Act. xvi. Suppl. p. 119, t. 25.

Several skins of both sexes of this fine species, which are coloured alike, obtained at Salinas (alt. 14,000 feet).

57. QUERQUEDULA OXYPTERA.

Anas oxyptera, Meyen, Nov. Act. xvi. Suppl. p. 121, t. 26.

Querquedula oxyptera, Tsch. F. P. pp. 55, 309.

Querquedula angustirostris, Ph. et Landb. Wiegm. Arch. 1863, p. 202.

One example from Salinas, the receipt of which has enabled us to clear up the confusion alluded to by Sclater in his notes on Chilian birds, *antea*, p. 335. There are two closely allied species of *Querquedula*—the present bird and *Q. flavirostris* (Vieill.). Messrs. Philippi and Landbeck have correctly pointed out the differences between them; but they have renamed the present species, not under-

standing that it is the true *oxyptera* of Meyen, who obtained his specimens in the highlands of Southern Peru, the same locality as that of Frobeen's specimens, and of the bird now before us. *Q. flavirostris* is the oldest name for the species better known as *Q. crecoides* (King). Its synonyms are correctly given by Burmeister (La Plata-Reise, ii. p. 516), if we strike out "*Anas oxyptera*, Meyen."

58. Larus belcheri, Vigors.

Leucophæus belcheri, Bp. Consp. ii. p. 232.

Skins of this species from the coast near Islay. A female is marked "bill at the base light yellow, at the point black tipped with red; eyes dark hazel; legs and feet yellowish green."

6. Notice of an Egg of the Great Moa (*Dinornis gigantea*), containing remains of an embryo, found in the province of Otago, New Zealand. By Dr. Hector, F.R.S., Government Geologist.

This highly interesting specimen was discovered last year by a party of workmen when excavating the alluvium of the Upper Chitha Plains, near the township of Cromwell in Otago, and was secured by Mr. Charles O'Neal, who transmitted it to the Colonial Museum.

When found the egg is reported to have been perfect, but was accidentally broken in the process of removal from the sandy loam in which it was imbedded at a depth of 2 feet below the surface.

At about 1 foot distant and 3 inches deeper was discovered another egg of equal size, but too far decomposed to admit of its removal.

Many of the fragments, both of the shell and of the contained bones, were unfortunately lost in consequence of the friable nature of the specimens, not more than half the shell having been preserved. The fragments, about twenty in number, when fitted together, comprised nearly one complete side of the egg. Its dimensions (as restored) are as follows:—

Long diameter 8·9 inches, short diameter 6·1 inches.

The texture of the shell is chalky and pulverable, the external surface having been a good deal eroded by the solvents in the soil, so that it has a rough granular surface, but still showing distinctly the characteristic linear pores of the Moa egg-shell.

A portion of the shell was analyzed, and was found to contain only 0·9 per cent. of organic matter, while a fragment of a recent Emu's egg-shell analyzed at the same time gave 7·89 of organic matter, thus showing approximately the changes which the Moa's egg has undergone in the soil.

The bones of the chick, which were contained in the egg, are of a rich brown colour, and have an extremely light spongy texture; they adhere to the tongue, and are completely free from traces of membranes, ligaments, or other attached organic matters.

In the Museum there is a specimen of an Emu's egg containing the chick-bones at about the same stage of development.

On comparing these two specimens, the principal difference consists in the dense brittle character and white colour of the Emu bones as compared with those of the Moa chick, and in the enormous disproportion in the massiveness and form of the bones of the extremities in the latter case, with the very slight difference in the size of the cranium and total relative height of the embryos.

The specific gravities of these bones are respectively—

Moa chick	1·538
Emu chick	1·577
Bone of old Moa	1·700 to 1·979

The comparative length of the principal bones of these chick-skeletons are as follows: —

	Moa chick. inches.	Emu chick. inches.
Cranium	2·1	2·0
Pelvic bones	2·6	1·6
Femur	1·7	1·2
	(Diameter of shaft ·35 in.)	(Diameter of shaft ·28 in.)
Tibia	3·0	2·1
	(Diameter of shaft ·35 in.)	(Diameter of shaft ·16 in.)
Fibula	2·0	1·5
Tarso-metatarsus	1·9	1·8

Probable total length of Moa chick 14·5 inches.
Probable total length of Emu chick 13·0 inches.

Weight of bones of extremities and pelvis—

In the Moa chick	167·0 grains.
In the Emu chick	40·5 grains.

Or in the proportion of 4 to 1.

7. Description of *Ateles bartlettii*, a New Spider Monkey from the River Amazons. By Dr. J. E. Gray, F.R.S., V.P.Z.S. &c.

(Plate XLVII.)

One of the most important zoological results of Mr. Edward Bartlett's exploring excursion up the River Amazons has been the discovery of a new Spider Monkey*, which differs from all the species of this usually lugubrious genus in the brightness and beautiful disposition of its colours. Mr. Wolf has made a beautiful drawing of this specimen, which is now in the British Museum collection.

Ateles bartlettii, sp. nov. (Pl. XLVII.)

Fur abundant, long, and soft. Black; the cheeks white; a band across the forehead over the orbits bright reddish yellow; the chest,

* See Mr. Bartlett's notice of the discovery of this species, P. Z. S. 1867, p. 2.

belly, inner side and front and back part of the limbs, and the side and under surface of the tail yellow.

Hab. Eastern Peru, near Xeberos (*E. Bartlett; Brit. Mus.*).

The black part of the hands and legs near the yellow colour is varied with more or less abundant yellow hairs.

I have named this fine species after Mr. A. D. Bartlett, the Superintendent of the Society's Gardens, and his son Edward (who discovered it).

8. Notes on *Catillus*, Humphrey, or *Navicella*, Lamarck, with Descriptions of Two New Genera. By Dr. J. E. Gray, F.R.S., V.P.Z.S., F.L S., &c.

Linnæus and Bory St. Vincent referred this shell to the genus *Patella*. Chemnitz properly removed it to *Nerita*; and De Roissy considered it a species of *Crepidula* of Lamarck. Other authors have regarded it as the type of a genus. Thus Humphrey called it *Catillus*, Schumacher *Sandalium*, Férussac *Septaria*, and Lamarck *Navicella*.

Lamarck and Férussac divided their shells into two or three species:—the one having an oval, convex, more or less thick, solid shell, and more or less acute spire, which was called *N. elliptica*, Lamk., and *Septaria borbonica*, Férussac; the other a narrow oblong thin shell, more or less rounded at each end, called *N. lineata*, Lamk., and *Septaria navicula*, Férussac. These two species are the types of two forms, each of which has been divided into several species. The forms are generally distinctly marked; but there are a few specimens which seem to be more or less completely intermediate between them.

Mr. Lovell Reeve, in his 'Conchologica Iconica,' has divided the specimens into thirty-three species, or pseudo-species (most, if not all, of them figured from specimens in Mr. Cuming's collection), separated from each other by slight modifications in the form of the shell and of the inner lip, and in the distinctness and distribution of the colours. I think I may state, without any fear of contradiction, that it is utterly impossible to distinguish a large proportion of the species proposed in this work by the specific characters, or even by the figures given. Such characters and figures are merely to satisfy the rule that a species is not established unless it is characterized; but surely that implies that it shall be characterized so that it may be distinguished; otherwise, as in this case, it is a mere pretence, and therefore best avoided.

Mr. Reeve does not give figures of or describe the operculum of any of the species, which is the less excusable as Mr. Cuming's collection, from which the figures are taken, contains the opercula of more than a third of the shells which he has regarded as species; and the opercula of the different specimens present such modifica-

tions of form and structure that they at once distinguish the species, and serve to divide them into most natural groups. The non-attention to such particulars greatly diminishes the value of the 'Conchologica Iconica,' and removes it from the category of scientific works. It is the less excusable, as the opercula could in this and in very many cases have been added with scarcely any appreciable additional trouble. The fact is that I suppose Mr. Reeve intended it for a mere shell-dealer's catalogue, and not a scientific conchological and malacological work.

The species that are in a perfect condition (that is to say, that are accompanied by their opercula) in Mr. Cuming's collection may be arranged as in this essay. An operculated shell without its operculum is in a very imperfect condition, as the operculum is most important in the organization and economy of the animal, and it often affords most important characters for the distinction of the species and the determination of the genus to which the animal and shell is to be referred; so that an operculated shell not accompanied by its operculum must be regarded as wanting one of its most important organs.

Messrs. H. & A. Adams, in their 'Genera' (p. 386), divide *Navicella* into three subgenera, according to the position of the nucleus of the spire:—I. Apex of spire straight, on the edge of shell. II. *Septaria*: Apex of spire submarginal, entire, as *N. cookii*. III. *Elana*: Apex slightly elevated above the edge, and recurved laterally, as *N. lapeyrousii*. These characters appear to me of very slight importance; and the form of the apex of the spire varies in specimens from the same locality, which I should be inclined to regard as the same species. The operculum of the genus is described by them as quadrangular. This would exclude *Navicella lineata*, which these authors referred to the second subgenus. These subgenera are adopted by Chenu in his 'Manual' (p. 338).

Adams figures the animal of *Catillus lineatus* (t. 42. f. 4) and the shell and operculum of *Catillus porcellanus* (t. 42. f. 4 *a*, *b*, *c*).

The family Neritinidæ may be thus divided into two tribes:—

I. Neritinina. Aperture of shell moderate; spire conical; operculum the size of the aperture of the shell, horny, with a shelly plate nearly of the same size as the horny operculum.

II. Catillina. Aperture of the shell very large, ovate; spire rudimentary; operculum small, horny, with a shelly plate produced beyond the edge of the horny operculum, which with the operculum is much smaller than the aperture of the shell.

The operculum of *Catillina*, as in other shells which are said to have a shelly operculum, consists of two parts:—1, the horny plate, which is affixed to the hinder part of the foot of the animal; 2, the shelly part, which is on the outer side of the horny plate, or *true operculum*, and which, as it increases in size, is produced beyond the end of the foot; the free end is generally bifid, with a produced

marginal process. The outer surface of the shelly part of the operculum is generally radiately and concentrically striated, and furrowed with two more or less distinct ribs radiating from the nucleus to the outer edge; the ribs across the middle of the plate generally end in a rounded lobe; that on the right margin of the plate is much more distinct, narrow, linear, and ends in a projecting spine. The inner surface of the plate is smooth, or with a few concentric marks showing how the shelly matter was deposited as the plate increased in size and thickness. The shelly plate of the operculum in the larger number of species is more or less quadrangular, with the horny operculum oblong, occupying the broadest part of the base and forming a fringe to that edge. In others the shelly plate is oblong elongate, with the horny operculum triangular, and occupying one of the halves of the lower half of the entire operculum.

Tribe I. CATILLINA. *Operculum subquadrangular; the horny (true) operculum oblong, transverse, occupying the broader end; the other more or less dilated, two-lobed, the marginal lobe acute, linear. Shell elliptical, mouth wide.*

1. CATILLUS.

Shell elliptical, mouth wide; inner lip flat, shelving, transverse, or slightly regularly arched; operculum shelly plate subquadrangular.

A. *The operculum as broad as long; the right rib well marked, separated from the margin by a granular space, which is broader near the nucleus; the right edge near the base denticulated; the nucleus rugose, granular; the terminal lobes unequal—one broad, the other linear, spine-like.* (Figs. 1 *a*, 1 *b*.)

Fig. 1 *a*. Fig. 1 *b*.

Fig. 1 *a*. Outer surface. Fig. 1 *b*. Inner surface.

* *Operculum large, thick, dark coloured.*

1. CATILLUS JANELLI, Reeve, Icon. f. 1. (Operculum, Fig. 1.)
Hab. Philippines.

** *Operculum moderate, thin.* Elana.

2. CATILLUS CLYPEOLUM, Reeve, Icon. f. 24.
Catillus affinis, Reeve, Icon. f. 15.
Hab. Philippines.

3. Catillus cooki., Récluz; Reeve, f. 14.
Hab. Philippines.

4. Catillus orbicularis, Sowerby; Reeve, f. 5.
Hab. Philippines.

5. Catillus lapeyrousii, Récluz.
Hab. ——?

6. Catillus suborbicularis.
Hab. ——?

7. Catillus bougainvillii, Récluz; Reeve, Icon. f. 30.
Catillus ornatus, Adams and Angas.
Hab. New Ireland.

8. Catillus variabilis.
Hab. ——?

9. Catillus macrocephalus, Reeve, f. 28.
Hab. Feejee Islands.

10. Catillus depressus, Lesson; Reeve, f. 3.
Hab. Tahiti.

11. Catillus magnificus, Reeve, f. 16.
C. scarabæus, Reeve, f. 12.
——? *capuloides,* Reeve, f. 19.
Hab. Australian Seas; Harmond's Islands.

12. Catillus haustrum, Reeve, f. 18.
Hab. New Caledonia.

13. Catillus sanguisuga, Reeve, f. 17.
Hab. New Caledonia.

14. Catillus porcellanus, Reeve, Icon. t. 2. f. 6.
Patella porcellana, Linn.
Septaria borbonica, Férussac.
Sandalium pictum, Schum.
Navicella bimaculata, Reeve, Icon. t. 1. f. 2.
N. elliptica, Lamk.
Hab. Mauritius; Isle of France, Bourbon.

B. *Operculum moderate, as long or longer than broad, thick; upper lobes subequal, obtuse or acute; the right rib indistinct and separated from the margin by a granular space, which is widest in the middle of the edge; nucleus obscure, punctured.* Laodia. (Figs. 2 *a*, 2 *b*.)

Fig. 2 *a*. Fig. 2 *b*.

Fig. 2 *a*. Outer surface. Fig. 2 *b*. Inner surface.

15. Catillus cumingianus. (Operculum, Fig. 2.)

Navicella cumingiana, Récluz; Reeve, f. 7.
N. luzonica, Schlegel; Reeve, f. 11.
Hab. Philippines.

The opercula of this species are very variable in shape: some are much longer than broad, and have very acute lobes; this is especially the case in the smaller specimens.

There are several other species figured by Mr. Reeve that probably belong to this species; but as they are destitute of opercula it is not possible to determine their true place in the system, or their affinity to the other species. Like other fluviatile shells, they are liable to great variations in size, form, and colour.

2. Paria, n. g.

Shell elliptical, mouth wide; inner lip flat, shelving upwards, produced and truncated in the middle, with a roundish notch on each side near the margin of the cavity; operculum—shelly plate subquadrangular, lower edge straight, transverse, with a flexible flap, the upper edge with two lobes, the marginal lobe elongate, linear.

* *Shelly plate of operculum broad, flat, thin.*

1. Paria freyceneti.

N. freyceneti, Récluz; Reeve, Icon. t. 1. f. 4.
Hab. New Hebrides.

** *Shelly plate of operculum narrow, high, solid, thick.*

2. Paria psittacea.

N. psittacea, Récluz; Reeve, Icon. f. 23.
Hab. Australian Islands.

Tribe II. Stenopomina. *The operculum oblong elongate, narrow; the horny (true) operculum triangular, very oblique as regards the axis of the shelly plate (occupying the triangular right half of the hinder half of the entire operculum), acute near the nucleus, and rounded at the end; shelly plate of the operculum elongate, thin, with two elongated ridges on the upper end, the marginal one produced into a spine, with a*

notch on its left margin (Figs. 3 *a*, 3 *b*). *Shell elongate, mouth elongate, narrow.*

Fig. 3 *a*. Fig. 3 *b*.

Fig. 3 *a*. Outer surface. Fig. 3 *b*. Inner surface.

The operculum has a very thin brittle shelly plate, which is separated from the horny (or true) operculum by a distinct straight line running from the centre of the right side of the operculum to the outer side rather above the base. The outer surface of the shelly plate is slightly convex, smooth, very finely concentrically striated, with a diverging rib from the nucleus to the upper edge, and with another more distinct linear rib on the right margin, which ends in a slender spine; the space between the diverging ribs is depressed and striated, like the rest of the surface. According to the figure of the animal in Adams's 'Genera' (p. 386, t. 42. f. 4), the end of the operculum is produced beyond the end of the foot.

Stenopoma, n. g.

Stenopoma lineatum. (Operculum, Fig. 3.)

Navicella lineata, Lamk. E. M. t. 456. f. 2; Reeve, t. 8. f. 31.
N. tessellata, Lamk.; Reeve, t. 6. f. 27.
Septaria navicula, Férussac, Bull.
Hab. Philippine Islands.

Lamarck divided these shells into two species, according to the coloration, calling one *lineata* and the other *tessellata*; but the two systems of coloration gradually pass into each other in the different specimens; and some specimens present the two kinds of coloration each well marked: for example, one was *C. lineata* when young, and became *C. tessellata* afterwards; so that the upper part of the shell is of one species, and the margin of the other.

The specimens from the same locality present considerable variation in the general form of the shell, some being much narrower and more convex than others, and also in the form, position, and extent of the hinder lip.

These shells have a general external resemblance to the compressed Limpets (*Patellæ*), that live in the cavities which they eat out at the base of the roots of *Algæ*, or on the cylindrical stems of those plants. They do not appear to derive their form, like those shells, from adapting themselves to the form of the body to which they happen to be attached; and, indeed, Mr. Cuming states that the specimen which he procured in the Philippines lived on stones, like the *Catilli*. Though they are compressed and oblong, the base of the cavity is flat and even, as much so as the circumference of

the cavity of the ovate *Catilli*; while the compressed Limpets have the base arched; that is to say, the side of the shell that embraces the cylindrical stem, or fits into the concavity in the roots of the large *Fuci*, is produced to fit the form of the body to which it is attached. The Limpets, when placed on a flat board, rock from end to end.

The small thin shell of the small species that lives in Calcutta differs from the others in having the side of the cavity rather produced, like the Limpet above described. They are said to have been obtained in the Botanic Gardens and in the ditches near the city; but it is not stated if they live on stones, or if they live on the stems of the plants; if the latter, that may explain the peculiarity of their form.

The following species probably belong to this or the following genus; but their opercula have not been observed or kept:—

1. Navicella entrecasteauxii, Récluz, Rev. Zool. 1841, p. 380; Reeve, t. 8. f. 32.

Hab. Australia, Point Entrecasteaux, King George's Harbour.

2. Navicella orientalis, Reeve, Icon. t. 8. f. 33.

Navicella cærulescens, Reeve, Icon. t. 7. f. 29.
Hab. India: Calcutta, in the Botanic Gardens (on plants?).

3. Navicella eximia, Reeve, Icon. t. 6. f. 26.

Navicella reticulata, Reeve, Icon. t. 5. f. 20.
Hab. Ceylon (*F. Layard*).

Tribe III. Orthopomina. *Operculum oblong, rather elongate; horny (true) operculum triangular, rather oblique as regards the axis of the horny plate; shelly plate half oblong, rather narrowed above and rounded at the upper edge, with a very slight fold diverging from the nucleus to the left upper margin; the anterior cartilaginous flap large, broad* (Figs. 4 *a*, 4 *b*).

Fig. 4 *a*. Fig. 4 *b*.

Fig. 4 *a*. Outer surface. Fig. 4 *b*. Inner surface.

Orthopoma, n. g.

Shell ——?

This form is described from a single operculum which was found separated from the shells in the drawer of *Navicella* in Mr. Cuming's collection. I have no doubt it belongs to some shell in the collection, and most likely one named and figured by Mr. Reeve.

Mr. Cuming, fortunately, in some instances attached an operculum

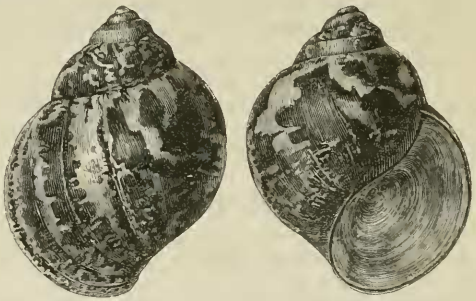
(and sometimes two or three) to the cavity of one or more shells of a species, so that there is no doubt of the operculum belonging to that species; but in general, as he kept his shells lying loose on cotton-wool, so he placed the opercula on the cotton-wool under the shells to which they belonged. Unfortunately, under these circumstances, an operculum becomes easily separated from its shell, as must have occurred in this case. Sometimes he preserved more opercula than specimens of the shell; but in this case there is only one operculum of the form in the drawer. The operculum is no accidental variation of either of the other forms; it is destitute of the two diverging rays which are so characteristic of each of them. In the angularity of the lower edge, compared with the rest of the shelly plate, it is between the two forms before described. In its very wide cartilaginous flap it is like the second form, or that of the genus *Stenopoma*.

9. Description of *Saulea*, a New Genus of *Ampullariadæ* from Sierra Leone. By Dr. J. E. Gray, F.R.S., V.P.Z.S., &c.

The British Museum has received a specimen of *Ampullaria* from Sherboro, near Sierra Leone, where it was collected. It differs from all the species of the family in being beautifully variegated, and more like a terrestrial *Bulimus* than a freshwater shell. It is, at the same time, peculiar for the thinness of the shell and operculum, these not being thicker than thin writing-paper.

The regularity of the colouring shows that it is not an accidental variation, but a normal state of the species.

The species is also well marked by its form, having a more produced conical spire than most of the species of the genus, and the upper whorls of the spire are peculiar for being obscurely keeled. The keel gradually becomes less visible, and the later ones regularly rounded.



Saulea vitrea.

Saulea.

Shell ovate, subglobose, very thin, parchment-like, elastic, dark-coloured, covered with a very thin, hard, olive periostraca. Spire

conical, whorls rapidly enlarging; upper whorls minutely keeled, the others rounded; axis imperforate. Aperture ovate, periostraca thin. Opercules ovate, size of the aperture, shelly, thin, elastic like the shell, concentrically striated externally, nucleus near the margin of the middle of the columella side.

Hab. Africa.

This shell differs from all the other *Ampulariadæ* in its extreme thinness and elasticity, in the keeled upper whorls, and in the surface being variegated. The substance of the shell contains so much animal matter that when bruised a depression, and not a hole, is formed in the surface.

I have named this genus of beautiful shells after my friend Miss J. Saul, who has the finest private collection of shells in the country.

SAULEA VITREA.

Shell ovate, subglobose, very thin and light, smooth, blackish brown, variegated with bright yellow blotches from interrupted flexuous transverse bands; spire conical, about two-thirds the length of the aperture; apex rounded; upper whorls obscurely keeled; last whorls regularly rounded; axis imperforate; peristome thin; operculum shelly, very thin, with the nucleus near the middle of the inner or columellar margin.

Helix vitrea, Born, Mus. 383, t. 15. f. 15, 16; Chemn. xi. 282, t. 210. f. 2072, 2073.

Ampullaria vitrea, Reeve, Conch. Icon. f.

Hab. River Sherboro, Sierra Leone. B.M.

10. Observations on Dr. Bowerbank's Paper on *Hyalonema lusitanicum*. By Dr. J. E. GRAY, F.R.S., V.P.Z.S., F.L.S., &c.

Dr. Bowerbank read a paper at the Society's Meeting on the 28th of November in which he concludes, "from microscopical examination, that *Hyalonema lusitanicum*, which has lately been elevated to the rank of a genus by Dr. Gray, and proposed to be called *Hyalothrix*, is not even specifically distinct from *H. mirabile* of Japan."

When Dr. Bowerbank prepared and read that paper, he had not seen, much less microscopically examined, the specimen on which my genus *Hyalothrix* was established, which is the only specimen of *Hyalonema lusitanicum* in this country.

It appears that he had examined a part of the sponge that was found attached to one out of the twelve specimens of this coral that M. Bocage had obtained. Finding that sponge very similar to that attached to the Japanese *Hyalonema*, he pronounced the two corals to be of the same species.

Admitting that the sponge, the twisted axis, and the polypes are one sponge, which Dr. Bowerbank believes, though it is against the universal opinion of all other zoologists, it surely is a very rash

proceeding to pronounce that the specimens from Lisbon and from Japan are the same, after simply examining and comparing one part of the specimens, viz. the sponges attached to their bases, more especially since M. Bocage has shown that the spicules of which the rope-like axis is formed, and the palythoid animal on the bark, are differently constructed.

It is to be observed that my genus *Hyalothrix* was established on characters quite independent of the sponge examined by Dr. Bowerbank; for at the time it was proposed no specimen of the coral with a sponge attached to it had been obtained; and the similarity or non-similarity of the sponge of the Portuguese and Japanese specimens can have no influence on the generic or specific characters of the two corals, part of the characters being the difference in the number and disposition of the tentacles (that Dr. Bowerbank will not see), characters sufficient to separate the animal into genera, whether the animal is a parasitic *Palythoa*, or is the animal that forms the rope-like siliceous axis. They are characters observed not by me, but by M. Bocage; so that, in fact, Dr. Bowerbank's attempt, in which he says "he has smashed me," does not bear very heavy on my head.

I have seen *Palythoæ* affixed on shells containing Bernhard Crabs, from several localitities at a distance from each other; I have never seen these *Palythoæ* on any other habitat. No one can believe that the three were one animal, as is Mr. Bowerbank's theory with regard to *Hyalonema*.

The *Palythoa*, the shell, and the Bernhard Crab (*Pagurus*) from each locality are peculiar, and always of the same species—the shell, crab, and *Palythoa* being the species peculiar to the locality, viz. Great Britain, United States, Sierra Leone, and Australia; so that the fact of animals living in the same communities and circumstances in different countries is no proof they are of the same species.

Dr. Bowerbank, when he came to see the specimen of *Hyalonema lusitanicum* the day after the paper was read, observed that he had not been able to find one kind of spicula in the Portuguese sponge that is found in the Japan one; so that probably the result of Dr. Bowerbank's paper will be to show that there are two species of sponges belonging to the genus *Carteria*, one Portuguese and the other Japanese, instead of proving that the Japanese and Portuguese *Hyalonema* are of one species. That is, if we can place reliance in Dr. Bowerbank's microscopical examinations; for, as, when he heard that a sponge had been found attached to one of the Portuguese specimens, he had predicted that it would be found to be the same as the Japanese one, he is as desirous to find that it is so, for fear he may loose his character as a prophet, as he is not to see the tentacles and gonidia in the animal of *Hyalonema*, which, therefore, he does not see! though Brandt, Schultze, and Bocage have seen, described, and figured them, and many other microscopical observers have seen them at the late soirée of the Microscopical Society. Such capricious faculties of seeing and not seeing make one lose one's faith in Dr. Bowerbank's later observations.

Mr. Lee has kindly shown me the specimen of *Hyalonema sie-*

boldii on which Dr. Bowerbank made his observations, stating that the bark was smooth and the polypes of an oblong form as in *H. lusitanicum*. It is simply a specimen of the Japanese coral from which the bark has been stripped off, and then again artificially attached to the axis, the bark having lost its external granular coat in the process, so that only the smooth inner layer of the bark is shown. The external form of the polypes has been altered in the manipulation; and I am convinced, from the irregular form that they exhibit, that if the specimen were soaked in water the animal would assume its regular circular form, and be exactly like the animal of the other Japanese specimen. I have seen some others similarly artificially altered. They are very unlike the close, regular, oblong-shaped animal of *H. lusitanicum*; and I am convinced that if Dr. Bowerbank had seen the type specimen of the latter before he wrote his paper he would not have made such a mistake.

11. Observations on the Preserved Specimens and Skeletons of the *Rhinocerotidæ* in the Collection of the British Museum and Royal College of Surgeons, including the Descriptions of Three New Species. By Dr. J. E. Gray, F.R.S., V.P.Z.S., &c.

The *Rhinocerotes* of Asia and Africa are known by the conformation of their jaws. The African species are easily distinguished by the form of the head and of their nose-horns. The species of Asia, on the other hand, are very difficult to separate from each other by any external character, and are only to be characterized by the form of their skulls and the locality which they inhabit, each zoological district having a peculiar species; and very probably there are yet species to be described, as the Rhinoceroses of China, of Beloochistan, and other countries have not been examined by zoologists.

The British Museum contains a good series of preserved specimens of this family, and a large series of skeletons, skulls, and horns; and there is also a very rich collection of skulls from different localities in the Museum of the Royal College of Surgeons,—the two collections affording good materials for the revision of the species of this group. I have to thank the Council of the College of Surgeons, and Mr. Flower, the energetic Curator of their Museum, for their kindness in allowing me to examine the skulls in their collection.

In the British Museum there are specimens of five species, viz. one *R. unicornis* and two *R. javanicus* from Asia, and four specimens from Africa (viz. two *R. bicornis*, one *R. simus*, and one *R. keitloa*), the three latter species being the animals that were collected and preserved under the superintendence of Sir Andrew Smith.

The Indian species (*R. unicornis*) has been often figured from life, amongst others by Dr. Parsons, in the 'Phil. Trans.' 1742, 1743, t. 1, 2; *R. sumatranus* by Mr. Bell from life in the 'Philoso-

phical Transactions;' and *R. javanicus*, by Dr. Horsfield; and the two latter also by Solomon Müller, in his 'Verhandlung,' who gives good figures of the adult and young.

Three African species have been well figured by Dr. Andrew Smith, in his 'Illustrations of the Animals of South Africa,' and two of them by Capt. Cornwallis Harris, in his 'Portraits of the Wild Animals of South Africa,' t. 16 & 19; so that the external appearances of these animals are well known.

The osteology of the species has been well represented by Camper, by Pallas (in 'Nov. Com. Petrop.' 1777), by Cuvier (in the second volume of his 'Ossemens Fossiles'), and further illustrated in De Blainville's valuable 'Ostéographie.'

In the British Museum there are three skeletons and ten skulls of the Asiatic species, and four skulls of the African *Rhinocerotes*.

The osteological collection in the British Museum is quite a modern creation, and has been made under great difficulties and with very limited funds. The Trustees at first objected to have any skulls or other bones; but it was proved to them that mammalia and other vertebrates could not be studied without a collection of skulls. The fact was, one of the Trustees, Sir R. Inglis, was also a Trustee of the Hunterian Collection (certainly offices that are not incompatible with each other; for my uncle, Dr. E. W. Gray, one of my predecessors in my present office, was, on the purchase of the Hunterian Collection, named one of the Trustees); and he stated to me that he was urged to prevent the collection of osteological specimens in the British Museum, as being a rival and injurious to the collection at the College of Surgeons. The difficulty was to a great extent removed when Mr. Bryan Hodgson offered the Museum his very large collections of skins and skeletons from the Himalayas, which were to be accepted together or declined together. Since that time the collection has rapidly increased, and, though it was much depreciated by Professor Owen in his evidence before the Royal Commissioners on the affairs of the British Museum, was then, and I believe is now, the best-determined and largest osteological collection in Europe. As to the rivalry, if any exists, it is to the benefit of both collections, for it is conducive to the activity of the Curator of each; but I have always felt, and the present Curator of the Museum of the College of Surgeons believes, that they are able greatly to assist each other. I only know that I take almost as much interest in the collection of the College as in that under my own care.

In the British Museum there is a skull belonging to the Indian one-horned type; it is the skull of a young animal with premolars of the milk series and the first permanent grinder appearing. It is considerably larger than the skulls of the Indian species of the same age, and therefore indicates a species fully as large as that animal. The skull is so different from that species in its compressed form and proportion that there can be no doubt that it belongs to a very distinct species, which has not before been observed. There are also two skulls from Borneo, which belong to a distinct and hitherto undescribed species.

The Museum of the College of Surgeons contains two skeletons and thirteen skulls of the Asiatic and three skulls of the African *Rhinocerotes*. One of these skulls is very interesting; it belongs to the one-horned Indian group, and is much like that of *R. unicornis* in general characters. It is an adult skull, with all the permanent teeth; and it is so much smaller than the skull of the adult or even a half-grown animal of that species, that it indicates an animal not more than half, or perhaps one-third, of the size of the common Indian Rhinoceros.

There are generally one or more skulls of the animals of the genus to be seen in the larger local museums, as, for example, at Manchester, Leeds, and York. If these skulls could be collected together and compared, they would form a most interesting collection for study; unfortunately they are generally without any certain history as to habitat &c.

Cuvier, in his essay above quoted, has given an excellent *résumé* of the history of the former knowledge of the animals; and I have only to observe that he did not discover that the skull figured by Camper, which he copied (t. 2. f. 7) and regarded as the skull of the adult *Rhinoceros bicornis*, is the skull of the *Rhinoceros keitloa*. He mentions *R. simus* as a distinct species, from M. de Blainville's note on the animal (from Mr. Burchell's MS.) in the 'Journal de Physique.'

The horns of these animals attracted the attention of Dr. Parsons, who figured several of them in a paper in the 'Philosophical Transactions' for 1742 and 1743, among the rest the horns of some African species, which have, since Cuvier's time, been determined, chiefly by the form of the horn, to be distinct species. Some of these horns are still in the British Museum.

t. 3. f. 4, 5. *Rhinoceros bicornis*, in B. M.
t. 3. f. 6. *Rhinoceros simus*, in B. M.
t. 3. f. 7. *Rhinoceros oswellii*, in B. M.
t. 3. f. 8, 9. *Rhinoceros keitloa*?

In the British Museum and in the Museum of the College of Surgeons there is a large series of the horns of both the Asiatic and African species.

Fam. 3. Rhinocerotidæ.

Nose simple. Upper lip subprehensile, with one or two horns on the central line. Toes three or five, united into a broad clavate foot, each with a separate broad nail-like hoof. Teeth:—Incisors variable or wanting, C. $\frac{1-1}{0-0}$, P.M. $\frac{4-4}{4-4}$, M. $\frac{3-3}{3-3}$, =28. Molar teeth with distinct roots.

Rhinocerina, Gray, Ann. Phil. 1825; Cat. Mamm. B. M. 186.
Rhinoceroten, Giebel, Säugeth. 191.
Rhinoceratidæ, Owen, Odont. 587; Schinz, Syn. Mamm. ii. 332, 1845.
Rhinoceratina, Bonap. Prodr. Mast. 11.
Rhinocerosidiæ, Lesson, N. Tab. R. A. 1858.

Synopsis of the Genera.

I. *The skin divided into shields by well-marked folds. Skull with the intermaxillary free, elongate; upper cutting-teeth long; nasal bones produced, conical.* Asiatic Rhinocerotes.

1. Rhinoceros. Horn single, anterior. Lumbar- and neck-folds of the skin well developed. Part of the occipital bone, near the occipital condyle, and the condyles themselves prominent.

2. Ceratorhinus. Horns two, one behind the other. Lumbar and neck-folds of the skin rudimentary. Occipital end of the skull flat. Condyle not prominent.

II. *Skin uniform, not divided into shields. Horns two. Skull:— internasal cartilaginous; intermaxillary free, very small; upper cutting-teeth none; nasal bones broad, rounded.* African Rhinocerotes.

3. Rhinaster. Head short, compressed; upper lip with a central prominence. Skull short behind; occiput erect; nasal bones rounded in front; lower jaw thick in front; grinders small, in arched series.

4. Ceratotherium. Head elongate, truncated; upper lip square. Skull elongate and produced behind; occiput erect, produced above; nasal bones broad, convex, truncated, and sharp-edged in front; lower jaw tapering in front; grinders large, in straight lines.

III. *Skin uniform, not divided into shields. Horn single. Skull:— internasal bony; nasal, internasal, and intermaxillary all united into one mass.* Asia and Europe.

5. Cœlodonta.

I. The Asiatic Rhinocerotes. *Skin divided into shields, separated by distinct folds. Nose-horn single, or with a small second hinder one; nasal bones produced, conical, acute; internasals cartilaginous; intermaxillary well developed, free; upper cutting-teeth two, compressed, well developed. Lower jaw attenuated in front, with a straight lower edge. Teeth* 34 :—*I.* $\frac{1-1}{2-2}$. *C.* $\frac{0-0}{0-0}$. *P.M.* $\frac{4-4}{4-4}$. *M.* $\frac{3-3}{3-3}$.

Rhinoceros § 2, Giebel, 205.
Rhinoceros, Gray, List of Mamm. B. M. 1840.
Rhinocéros munis de dents incisives, Cuvier, Oss. Foss. ii. 89.

The British Museum has a series of skulls of the four Asiatic species, showing the form of the skull in the different ages of the animal, from the just born to the adult or senile state.

There is a considerable difference in the form of the skull between the species which has one and that which has two horns, especially in the form of the occipital end of the skull and in the size of the occipital condyles. The difference is well represented in Bell's figure of the skull of the Sumatran animal.

I at first had a difficulty in distinguishing the difference between the skulls of the Javan and Sumatran species; but this arose from the British Museum having received from the Leyden Museum, through M. Franks, a skeleton of the *Javan* species under the name of *R. sumatranus*. But when I received a skull of the two-horned species from Pegu, the mistake in the name of the skeleton was soon discovered.

Some of the specimens of skulls of *R. unicornis* and *R. javanicus* in the British Museum have the foramen in the front of the eye over the front and others over the hinder edge of the second premolar. In both the specimens of *R. sumatranus* it is over the back edge of the first premolar.

The first premolar in the three adult specimens of *R. unicornis* is smaller than the same tooth in *R. javanicus*, and appears to be earlier shed; for in two of the skulls it has entirely disappeared with the alveolus that contained it, and in the other one the tooth is there, but it is nearly rootless and the alveolus is nearly absorbed.

The two large lateral lower cutting-teeth have a sharply keeled inner edge; but the teeth often wear almost entirely away, so that this form is lost.

The grinders of the milk or first series have much larger and more equal folds on the outer side than those of the permanent set; in the latter the front fold is linear and near the front margin of the tooth.

The teeth in some specimens appear to be rather smaller than in others, but there is a difference in the comparative size of the teeth with regard to each other in the series.

The presence or absence of small central lower incisor-teeth seems to be liable to considerable variation. In one adult skull from India there are two incisor-teeth; and in another there are two holes, but they are crowded together and are closing up.

In three specimens of *R. javanicus* there are no central lower incisor teeth, nor space for them; between the two large ones in the two other skulls, which are from younger animals, the central lower incisor teeth are well developed and cylindrical, being much the largest in the smaller and younger specimen.

The lachrymal bone varies in the different species, and is very characteristic. In *R. javanicus* and *R. nasalis* it is large, roundish, nearly as wide as high. In *R. unicornis* and *R. stenocephalus* it is narrow, oblong, erect, about twice as high as wide. In *Ceratorhinus sumatranus* it is very large, rather irregular-shaped, forming a considerable part of the cheeks of the skull. It differs a little in size and form in the specimens of the same species, but retains its general and distinctive forms.

There is a considerable variation in the size and form of the cavity under the zygomatic arch in the skulls that appear to belong to the same species. Thus in the four specimens of *R. unicornis*, which are nearly adult, two of them have the cavity short and broad, and two long and narrow. The same may be observed in the skulls of *R. javanicus* and *R. nasalis*. The aperture is widest, compared with its length, in the oldest specimens. This may probably be a sexual distinction. One of the skulls with a short wide opening is known

to have belonged to a male. The size and form of the cavity is, no doubt, greatly influenced by the age of the animal. The masseter muscle becomes thicker and shorter as the animal increases in age, the transverse width of the skull under the muscles becoming less as the animal becomes more aged (see some measurements, showing the fact, under *R. javanicus*). The same is shown to be the case in the series of skulls of *R. unicornis*.

Mr. Edward Blyth has published a memoir on the living Asiatic species of Rhinoceros, with figures of some of the skulls in the Museum of the Society, which may be consulted with advantage (see Journal of the Asiatic Society of Bengal, xxxi. 1862, p. 151); but unfortunately I have not had the power of comparing the skulls with those in the London collections:—

Rhinoceros indicus: narrow type of skull, t. 1. f. 1, t. 2. f. 1.

R. sondaicus: broad type of skull, t. 1. f. 2, t. 2. f. 2, from the Bengal Sundarbans, and Tenasserim; t. 1. f. 3, t. 2. f. 3, aged, from Java.

R. sumatranus, t. 3. f. 1, 2, male; t. 3. f. 3, female.

R. sumatranus, Tavoy, t. 4. f. 1–4.

The figures are from photographs, and they show the form of the occiput in the three species, confirming the fact that the occiput of the two-horned species is always flat and erect.

1. Rhinoceros.

Skin divided into distinct shields by deep folds. Lumbar fold well marked, and extending from the groin to the back. Horn one, short, conical. Upper lip with a central prominence. Skull:—forehead broad, flat, or only slightly rounded; the occipital end shelving from the occipital condyle to the occipital crest; the occipital condyles large, oblong, very prominent; lachrymal bone moderate.

The skulls of the larger number of species of this genus have the forehead and the upper surface of the nose flattened; this is seen in the living animal. But one species, of which there is only a single skull of a young animal in the British Museum, has the forehead and nose subcylindrical (that is, high on the central line and arched on the sides), as is the case with the Sumatran and the African Rhinocerotes. This character, I have no doubt, is equally visible in the living animal.

A. Forehead and nose behind the horn flat.

Nose square on the sides above; nasal short.	*R. javanicus*.
Nose shelving on the sides above; upper jaw slightly contracted before the grinders.	
Nasal broad, elongate	*R. unicornis*.
Nasal narrow, short	*R. nasalis*.
Upper jaw much contracted before the grinders; nasal narrow, short	*R. floweri*.

B. Forehead and nose subcylindrical, shelving on the sides above; nasal elongate ..... *R. stenocephalus*.

A. *The forehead and the nose behind the base of the horn flat, both in the living animal and skull.* Eurhinoceros.

* *Upper jaw slightly contracted in front of the grinders.*

1. Rhinoceros javanicus. Javan Rhinoceros. B.M.

Skull broad; forehead behind the horn broad, flat, or slightly concave, obscurely keeled on the sides near base of horn; intermaxillary bone elongate, slender, straight, without any upper process; lachrymal bone roundish, nearly as wide as high; nasal bones not quite two-fifths of the entire length of the nose and crown.

Rhinoceros javanicus, F. Cuv. et Geoff. Mam. Lith.; Gray, Cat. Mamm. B. M.; Solom. Müller, Verh. t. 33, ♂ ♀.

R. javanus, Blainv. Ostéogr. t. 1 (skeleton), t. 2 (skull, adult and jun.), t. 7 (teeth).

R. sondaicus (*R. unicorne de Java*), Cuvier, Oss. Foss. ii. 33, t. 14. f. 2 (skull), t. 17, 18 (skeleton); Raffles, Trans. Linn. Soc. xiii.; Horsf. Zool. Java, t. (animal); Blyth, Journ. Asiat. Soc. Bengal, xxxi. 1862, p. 151, t. 1. f. 2, 3, t. 2. f. 2, 3 (skull?).

Hab. Java. Skull of type from Mus. Leyden.

In the British Museum there are three skulls belonging to this species:—

1. A skeleton of an adult animal with a skull, purchased from the Leyden Museum, from Java.

2. An adult skull, received from the Zoological Society.

3. A skeleton with the skull of a half-grown animal, received from the Leyden Museum through M. Franks as *R. sumatranus*, from Sumatra. The skull agrees in all particulars, especially in the form of the occiput and the concavity and breadth of the forehead and nose, with the adult skull of *R. javanicus* from Java; so that there must have been some mistake in the name and habitat; perhaps the wrong skeleton was sent.

There is also an adult skull which has had the nasal bone cut off (722 *h*), which was received from the Zoological Society under the name of *R. unicornis*; but I have little doubt it is a *R. javanicus*, perhaps from Sir Stamford Raffles.

In the oldest skull (723 *d*) the aperture under the zygoma is 3 inches 7 lines wide in the widest part and 4 inches 9 lines long. In the adult skull 723 *a*, the aperture is 3 inches wide and 6 inches 1 line long. In the skull of the young specimen (723 *e*) the aperture is 2 inches 2 lines wide and 4 inches 7 lines long. The greater width is produced by the skull under the zygoma becoming so much narrower as the animal becomes aged. In 723 *d* this part is only 4 inches 7 lines, and in 723 *a* it is 5 inches 9 lines wide.

In the Museum of the Royal College of Surgeons there are *five* skulls that appear to belong to this species, but one or two of them are in a bad condition (nos. 2970 and 2971, the rest are not numbered).

Camper, who paid great attention to this species of Rhinoceros, in a letter to Pallas, printed in the 'Neue Nord. Beyträge' (vii. 249),

first pointed out that there were two Asiatic one-horned Rhinocerotes with upper incisors. His specimen, by the misfortunes of war, fell into the hands of Cuvier, and was described by him in the 'Ossemens Fossiles' (ii. 26). Cuvier regards the height of the occipital arch and the want of the apophysis on the upper edge of the intermaxillary as the chief character of the Javan species; but the apophysis is generally absent in the Indian species, it appears only to be found in the skulls of the very old males of that kind.

2. Rhinoceros unicornis. Indian Rhinoceros. B.M.

Skull:—forehead broad, flat, concave; nose behind the horn convex, subcylindrical, rounded at the sides; lachrymal oblique, longitudinal, oblong, rather four-sided; intermaxillary bones broad, thick, with a bony process on the middle of the upper edge; nasal bones short, broad, about two-fifths of the entire length of the nose and crown; zygomatic arch of the adult rather convex.

Rhinoceros unicornis, Linn. S. N. i. 104; Gray, List Mamm. B. M. 186; Gerrard, Cat. Bones B. M. 286; Cuvier, Oss. Foss. ii. t. 4. f. 1; Blainv. Ostéog. t. 2 (skull, adult).

R. asiaticus, Blumenb. Handb. 10, Abbild. t. 7 B.

R. indicus, Cuv. Mém. Mus. t. ; Oss. Foss. ii. 5, t. 1–4 (bones); F. Cuv. Mamm. Lithogr. t. ; Schinz, Syn. 333; Owen, Cat. Osteol. R. C. S. 513, nos. 2975 to 3074.

Indian Rhinoceros, Parsons, Phil. Trans. 1742–43, p. 525, t. 1, 2 (from life).

Rhinoceros inermis, Lesson, Cat.

Hab. India.

The skull figured by Cuvier and by De Blainville for the skull of *R. unicornis*, probably from the same skull in the Paris Museum, has a broad bony process on the middle of the upper edge of the intermaxillary bones. The skeleton and skull in the British Museum (722 *g*), from an adult male specimen that lived for several years in the Zoological Gardens, has this bony process well marked; so that it seems common in the species, if not a peculiar character of it.

Mr. Blyth thinks that "the adult *male Rhinoceros* that lived in the Zoological Gardens for several years, stated to have been captured in *Arakan*, was *R. sondaicus*." He proceeds, "The two Asiatic one-horned species, indeed, resemble each other a great deal more nearly in external appearance than the published figures of them would lead to suppose; certainly no sportsman or ordinary observer would distinguish them apart, unless attention had been specially called to the subject."—*Journ. Asiatic Soc. Bengal*, xxxi. 1862, p. 132. This explains how the species, now described for the first time, may have been overlooked.

In the British Museum there is the skeleton (722 *g*) with the skull of an adult animal that lived for several years in the Zoological Gardens, referred to by Mr. Blyth, and a skull from a just born animal, which was presented by Mr. Bryan Hodgson from Nepal.

There are in the British Museum other skulls which have been

received from various persons without any special habitat that can be relied on, which appear to belong to this species. They are all without the process on the upper edge of the large thick intermaxillary bones.

1. A fully adult skull (722 *d*), marked "India?".
2. An adult skull (722*f*) that was purchased of a dealer, without any specified locality.

In the Museum of the Royal College of Surgeons there is the skeleton of an adult animal (no. 2969 *a*) that formerly had the long front horns of an African Elephant placed on its nasal bones, which Mr. Flower, the present Curator, has properly removed.

There are also skulls of half-grown or female animals, with the seventh grinder just showing itself, of this species (nos. 2975, 2976), with a large oblong erect lachrymal.

All these skulls have thick intermaxillaries, and the front of the upper jaw, at the base of the intermaxillaries, is not suddenly contracted. In the three adult skulls it is 3 inches 9 lines wide; in the younger skull in the College of Surgeons (no. 2975) it is 3 inches 3 lines. The width of the diastema between the cutting-teeth and the front premolar is 2 inches 6 lines in all the specimens.

There is a stuffed specimen and a mounted skeleton of a young animal, just showing the horn, in the Free Museum at Liverpool, and the skull of a second of the same age. These two animals died on the voyage from Calcutta to Liverpool, were named *R. sondaicus* by Mr. Blyth, and preserved by Mr. Moore, the energetic Curator of that Museum. Mr. Blyth informs me there is a skeleton of *R. sondaicus* in the Anatomical Museum of Guy's Hospital, called *R. indicus*.

The Indian Rhinoceroses are long-lived. Mr. Blyth speaks of a pair that lived about forty-five years in captivity in Barrackpoore park: they were exactly alike in size and general appearance; they never bred; there is no difference in the horns or form of the skulls in the two sexes (Blyth, J. A. S. B. xxxi. 155).

The fœtal skull of *R. unicornis* (no. 722 D) in the British Museum, received from Mr. Bryan Hodgson, is short; the brain-case is oblong, ovate, swollen, and convex behind; the nasal bones are about as long as they are broad at the hinder edge, transversely convex above in the middle of their length and in the deep central groove in front above; the nasal cavity is long, high, and wide; the nasal bones are three-eighths of the entire length to the occipital crest; the length of the skull from the nasal to the front of the orbit is two-fifths of the entire length to the occipital condyles. The intermaxillaries are well developed, rather thick and short; they each bear two blunt teeth, scarcely raised above the alveolus, the first on each side is much larger and thicker than the hinder one, which is small and conical. There are three grinders developed on each side, the second and third being rather more developed than the small front one. There appears to have been a fourth tooth on each side more or less developed; but it and the cavity have been lost. The palate is narrow and deeply concave, nearly of equal width, but the sides are less

erect and more expanded behind than in front; the front edge of the hinder nasal aperture is narrow, and rather in front of a line even with the hinder edge of the third grinder; the length of the palate from the front edge of the intermaxillaries is rather longer than from the end of the palate to the suture between the basal sphenoid and the basal occipital bone. The vomer is compressed, and forms a well-marked broad ridge, which is much higher in front, and divides the internal nostrils. The lower jaw has the incisors just developed, and slightly projecting beyond the alveolus; they are oblong, with a rather sharp edge on each side. There are cavities for four grinders on each side; the small first ones are lost; the second and third are equally developed, just projecting and with smooth enamel edges; and the fourth are being developed, the crown being sunk rather below the alveolar edge.

Rhinoceros cucullatus (Wagner, Schreb. Säugeth. vi. 317; Giebel, Säugeth. 202), described from a specimen in the Munich Museum, appears to be only a specimen of *R. unicornis*, with a second horn added by the preserver.

3. Rhinoceros nasalis. (Figs. 1, 2.) B.M.

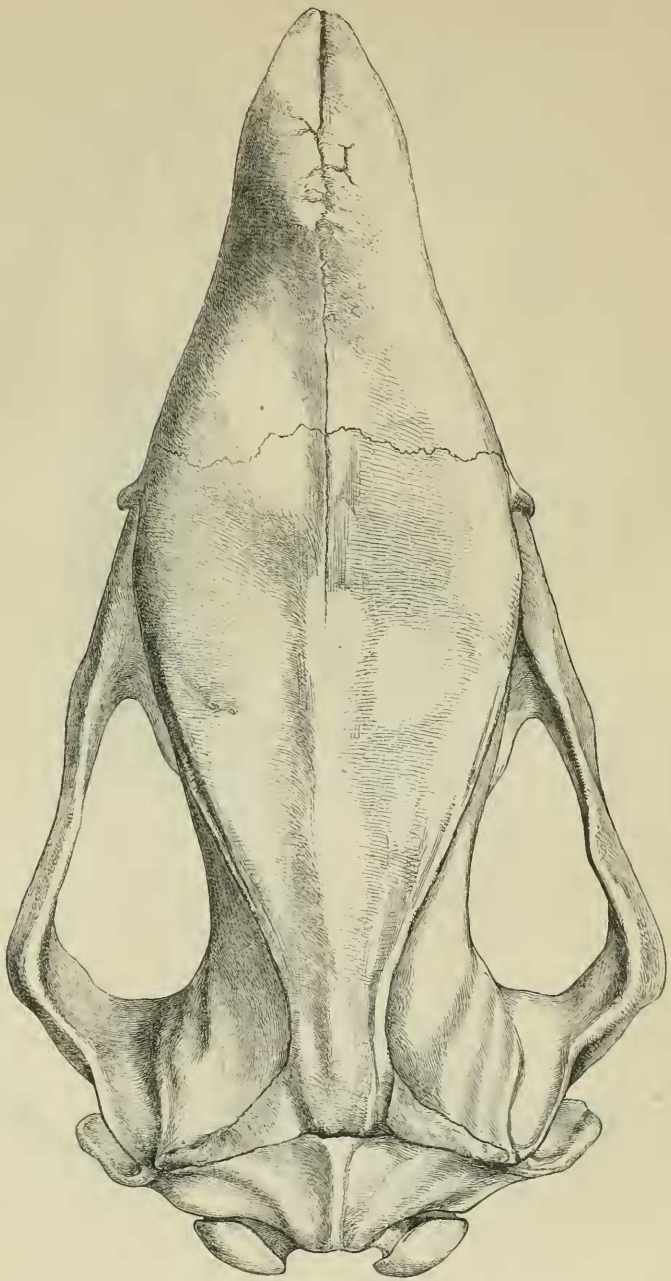
Skull elongate, the forehead and nose flat above, nose rounded on the sides in front; the nasal bones narrow, tapering, short, about two-fifths of the entire length of the skull from the nasal to the occipital crest; the zygomatic arch flat; lachrymal bone narrow, oblong, erect; the upper jaw only slightly contracted in front of the grinders ($3\frac{1}{4}$ inches wide).

Hab. Borneo.

There are two not quite adult skulls in the British Museum (nos. 723*b* and 723*c*) which appear to belong to this species. They slightly differ from each other; but this may be sexual. They agree with *R. unicornis* in the flatness of the crown, forehead, and nose, and in the nose being rounded on the sides, and also in the slight contraction of the upper jaw in front of the grinders, and in the comparative flatness of the zygomatic arch. They chiefly differ from the skull of that species of the same age,—1, in the greater length of the skull; 2, in the breadth and flatness of the forehead; 3, in the line of the forehead not being so concave; 4, in the comparative slenderness and shortness of the nasal bones, they are only two-fifths of the entire length of the skull from the end of the nasal to the occipital crest, while in the skull of *R. unicornis*, nearly of the same age, in the College of Surgeons (no. 2975) the nasal bones are at least four-ninths of the entire length. The nasal bones are narrower and more tapering, being about once and one-half the length of the breadth of the base. The upper jaw behind the internasal is only slightly contracted. They are at once known from *R. javanicus* by the greater length and narrowness of the skull, and the rounded form of the upper part of the nose, but they agree with the non-adult skull of that species in the shortness of the nasal bones.

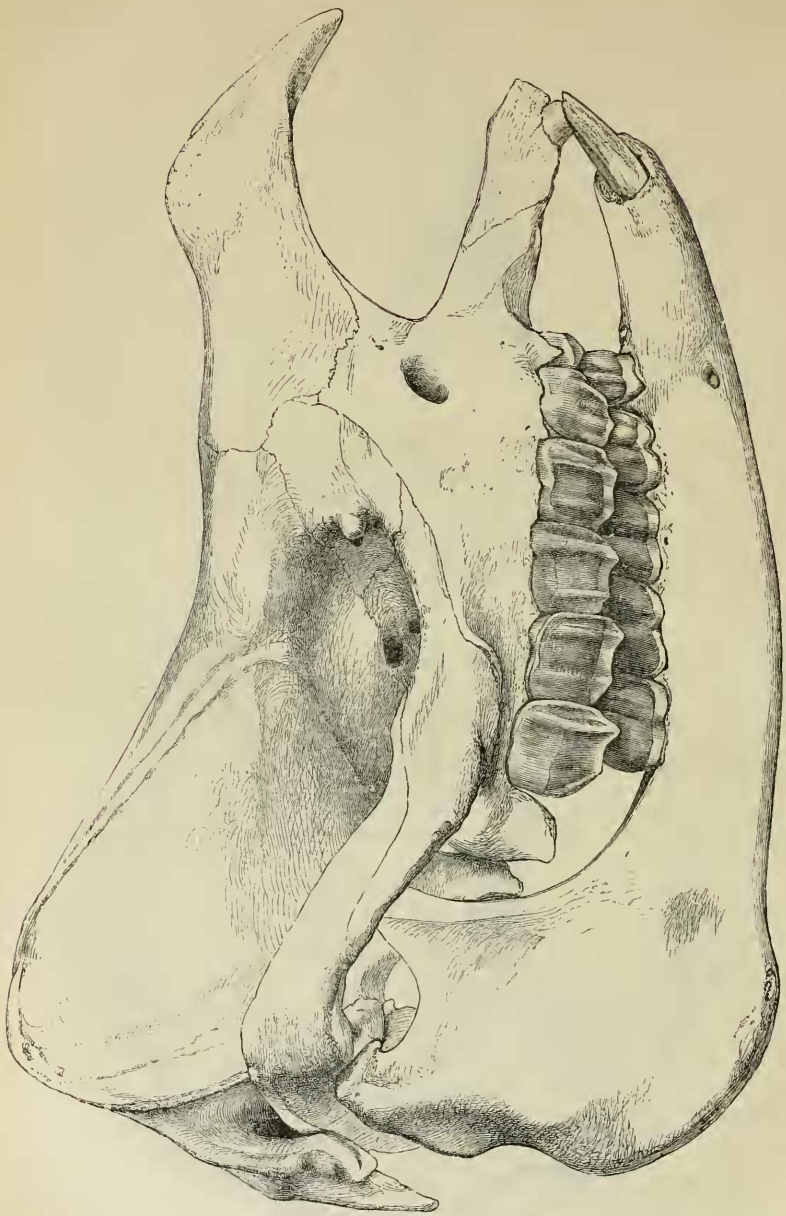
The two specimens rather vary from each other in the width of the nasal. 723*b* is a not quite adult animal; it is just showing

Fig. 1.



Skull of *Rhinoceros nasalis*.

Fig. 2.



Skull of *Rhinoceros nasalis*.

the last or seventh grinder, but it wants the intermaxillaries. It was purchased of a dealer, and has been marked "*R. sondaicus*, Cuvier, Java," by some previous possessor. The habitat may depend on the person having decided it to be *R. sondaicus*. The skull differs from 723*c* in the nasal being broader and more gradually tapering.

723*c* is nearly in the same state of dentition, as the seventh molar is just appearing. This was purchased of a dealer, who said that he received it direct from Borneo. The forehead, nose, and especially the nasal bones are narrower than in the preceding.

These skulls, from their size, indicate a species about the size or rather smaller than *R. unicornis*.

** *Upper jaw much contracted and very narrow in front of the grinders.*

4. Rhinoceros floweri. (Figs. 3, 4.)

Skull:—the forehead and nose flat above, the nose rounded on the sides in front; the nasal bones very slender, rather more than two-fifths of the entire length of the nose and crown; the zygomatic arch convex, arched outwards, having a very large roundish cavity for the temporal muscles; lachrymal bone elongate, expanded on the cheeks; the upper jaw suddenly contracted and very narrow (only $2\frac{1}{2}$ inches wide) in front of the grinders; the diastema very long, longer than in the adult *R. unicornis*, being $2\frac{3}{4}$ inches long.

Rhinoceros sumatrensis, Owen, Cat. Osteol. Prep. Mus. Coll. Surg. 506, no. 2934.

Tennu, Raffles, Linn. Trans. xiii. 164.

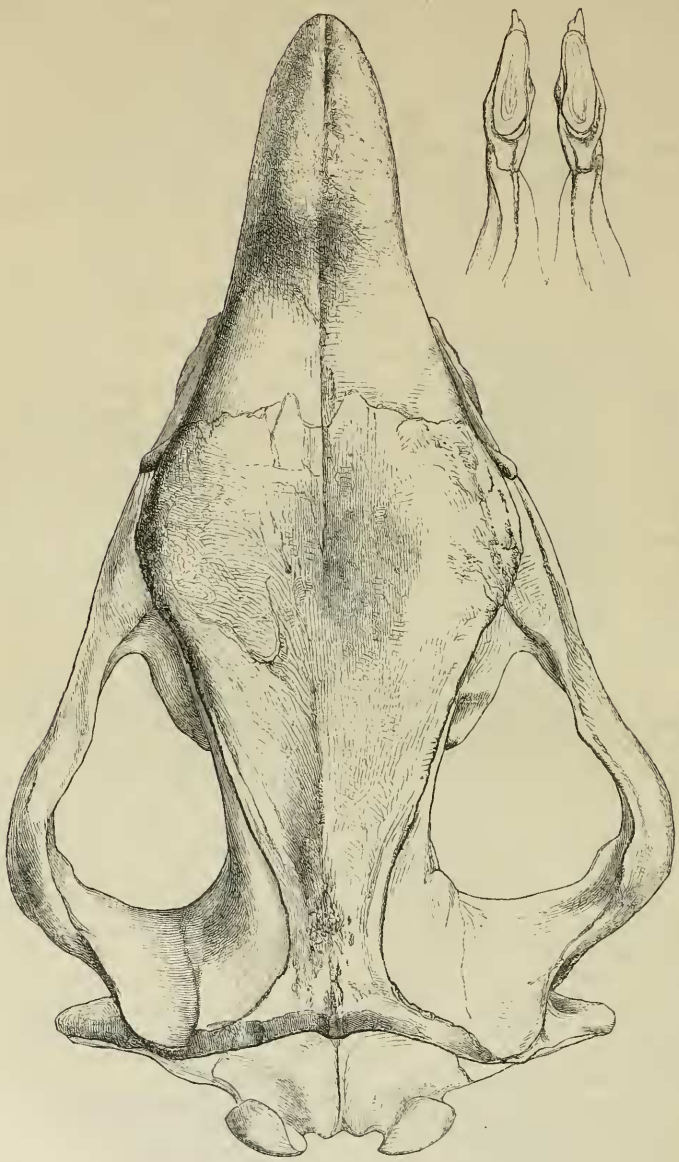
Hab. Sumatra (*Raffles*). Skull, Mus. Coll. Surgeons, no. 2934.

A skull of this species is in the Museum of the Royal College of Surgeons, described by Professor Owen as above cited, who calls it the cranium of a male Sumatran Rhinoceros (presented by Sir Stamford Raffles, P.Z.S.), observing that "the cranium offers no indication of the short hinder horn of this two-horned species." It is so distinct in form and size that I have no doubt of its belonging to a most distinct species. I propose to designate it after the energetic Curator of the Museum of the College of Surgeons, who in the few years that he has had charge of the collection has wonderfully improved it and increased its usefulness, not only to the zoological student, but for professional studies.

The skull is at once known from all the others I have examined by the convex prominent form of the zygomatics, and the contraction of the front of the upper jaw behind the cutting-teeth. It indicates a small species, not more than half the size of the common Indian Rhinoceros (*R. unicornis*).

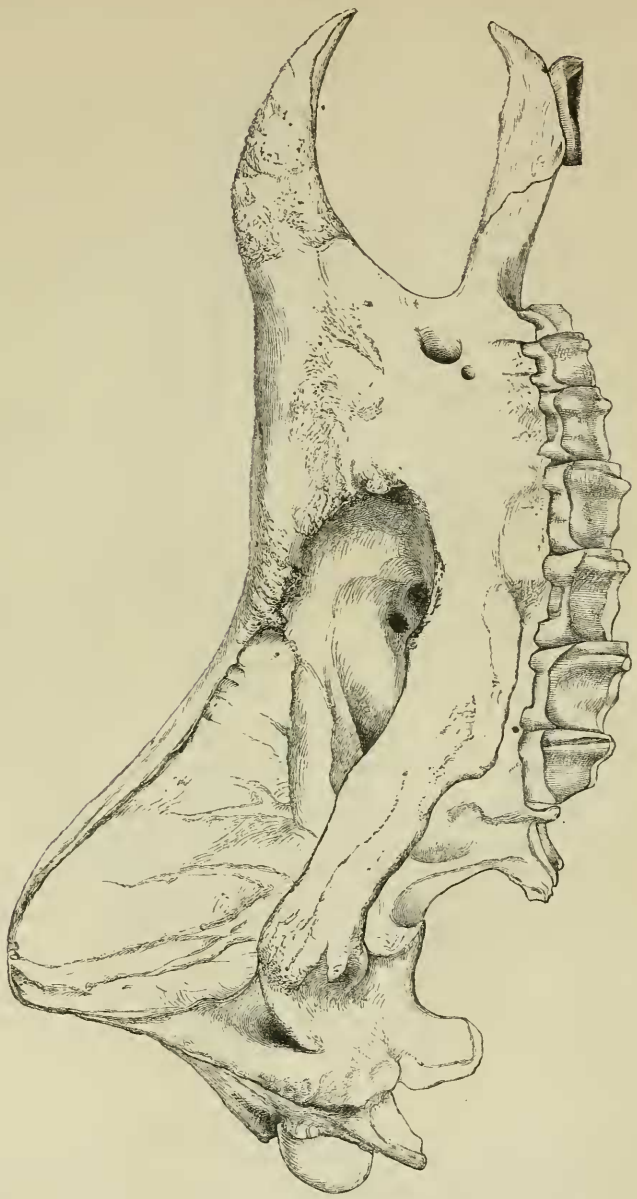
The skull no. 2934 is that of an adult animal with all its permanent teeth. It was named *R. sumatrensis* by Professor Owen: but it certainly is not a skull of that species; for the occipital end of the skull is projected and the condyle produced, and, though the skull is that of an adult animal, there is no mark of the root of the second

Fig. 3.



Skull of *Rhinoceros floweri*.

Fig. 4.



Rhinoceros floweri.

horn, which is always well marked in the adult skull of that species. It is also distinguished from that species, as it is from *R. unicornis* and *R. javanicus*, by the convexity of the zygomatic arch and the size of the cavity for the temporal muscles.

It has been suggested that this skull may have belonged to an Indian Rhinoceros that had been kept in a menagerie, and so very poorly fed that it never arrived at its full growth. The skull shows no sign of disease of any kind; the teeth are well worn down, as if it had had abundant food. Starvation is not likely to produce any such change in the proportions of the parts as this skull presents, when it is compared with the skull of the adult *R. unicornis*, or even when compared with the skull of a young *R. unicornis* of nearly the same size. Starvation is not likely to have decreased the growth, and at the same time to have extended the size and thickness of the temporal muscles, which is so characteristic of this interesting species.

This skull having formed part of the collection of Sir Stamford Raffles renders it probable that the animal was a native of Sumatra. Sir Stamford had in his collection a few specimens from other localities—some obtained from Singapore, that being the general entreport for the productions of the Malay peninsula and islands. There being in this collection only the upper jaw preserved, goes far to prove that it is not the skull of a menagerie specimen as has been suggested.

The skull has no character in common with the species to which Professor Owen has referred it, except its small size and probable habitat. It is to be regretted that, as well as writing a technical description of it, describing what every one can see in the specimen, he did not give more particulars of its history, and show by comparison the peculiarity of the skull as compared with others in the collection; but this would have required careful study. The want of more accurate details of the origin and history of the specimens is the general defect of this series of catalogues.

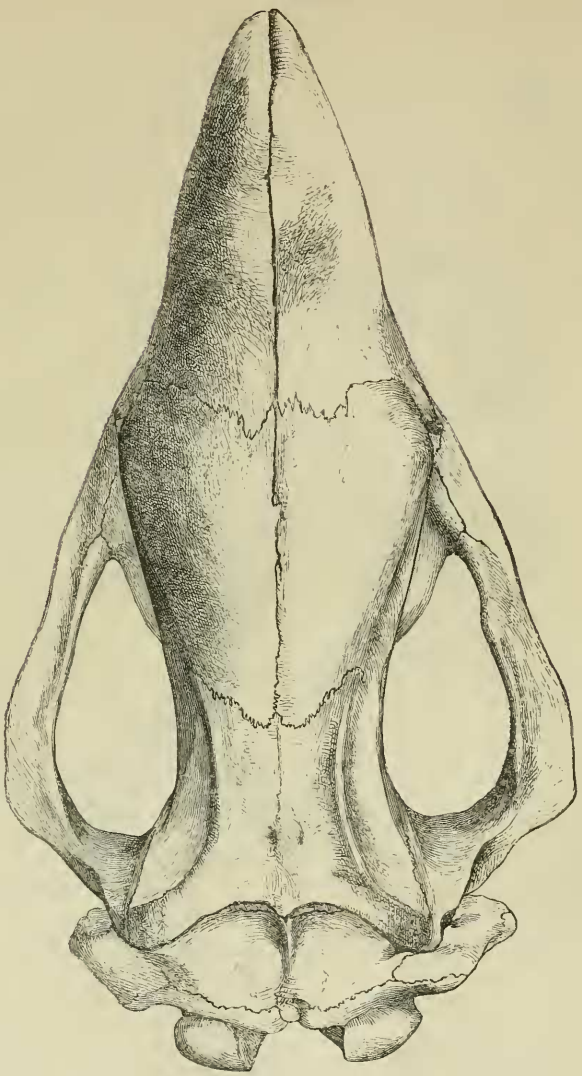
Sir Stamford Raffles observes, "There is another animal in the forests of Sumatra never yet noticed, which in size and character nearly resembles the Rhinoceros, and which is said to bear a single horn. The animal is distinguished by having a narrow whitish belt encircling the body, and is known to the natives of the interior by the name of *Tennu*. It has been seen at several places; and, the description given of it by several persons unconnected with each other corresponding generally, no doubt can be entertained of the existence of such an animal" (see Linn. Trans. xiii. 269; Blyth, *l. c.* 164). I have little doubt that the skull here described is that of the *Tennu*.

B. *The forehead and nose subcylindrical, rounded on the sides.*
Rhinoceros.

5. Rhinoceros stenocephalus. B.M.

Skull (half-grown) like that of *R. unicornis* of the same age, but

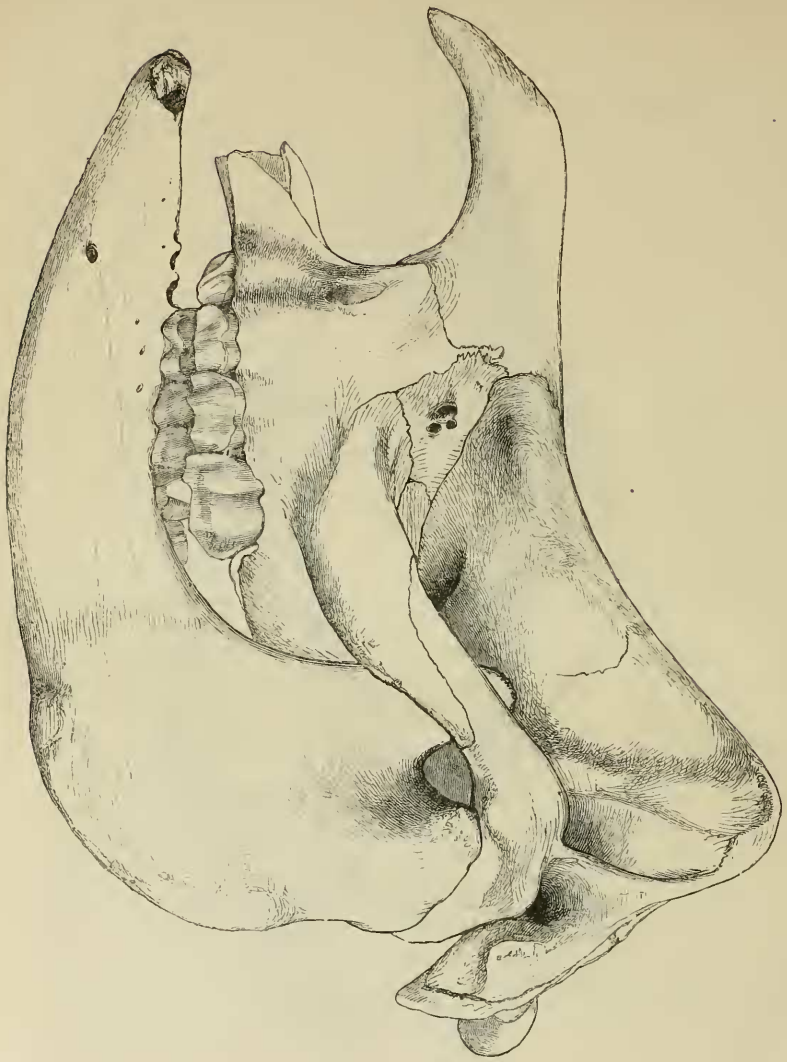
Fig. 5.



Rhinoceros stenocephalus.

narrower and compressed: the forehead is narrow and subcylindrical; the nose much narrower and more slender; the nose is semicylindrical at the base of the horn; the nasal bones narrow, gradually tapering in front, more than twice the length of the width at the base of the

Fig. 6.



Rhinoceros stenocephalus.

nasal, more than four-fifths of the length of the forehead from the internasal suture to the occipital crest; lachrymal narrow, oblong, erect, about twice as high as wide.

Hab. Asia.

There is a single skull of a half-grown animal of this species in the British Museum (722 *e*), which was received from the Zoological Society, without any special habitat. In the roundness of the nose it shows some affinity to the skull of *R. sumatrensis*; it is different from that species in many particulars, in the prominence of the occipital portion of the skull, and especially of the occipital condyles. When placed by the side of a *R. unicornis* of the same size and condition of teeth it stands rather higher, and is immediately known by the length and slenderness of the nose and nasal bones.

The following fossil species probably belong to this genus:—

1. Rhinoceros leptorhinus, Cuvier, Oss. Foss. ii. 71, t. 9, 10, 11; Blainv. Ostéogr. t.

Rhinoceros cuvieri, Desm. Mamm. 402.
Hab. Fossil.

2. Rhinoceros incisivus, Cuvier, Oss. Foss. ii. 89, t. 6. f. 9, 10; Blainv. Ostéogr. 1.
Hab. ——?

Cuvier (Oss. Foss. ii. 71, t. 9. f. 7) figures a fossil skull of a species of this genus from a drawing made at Milan by M. Adolphe Brongniart. See also an imperfect skull figured by Blainville (Ostéographie, t. 14, figure at left upper corner of the plate).

2. Ceratorhinus.

Skin divided into shields by deep folds, the lumbar fold rudimentary, short, only occupying the middle of the space between the groin and the back. Horns two: front longer, curved backwards; hinder small, conical. Skull:—forehead narrow, flat; the upper part of the nose on each side of the horns narrow, rounded, subcylindrical; the occipital region erect, the part near the condyles rather concave, the occipital condyle short, broad, oblong, placed obliquely inferior, scarcely prominent; lachrymal bone very large, irregular-shaped.

1. Ceratorhinus sumatranus. B.M.

R. bicorne de Sumatra, Cuvier, Oss. Foss. ii. 27, t. 4, iii. 42, t. 78. f. 8 (from Bell, skull).
Rhinoceros sumatrensis, Cuvier; Blainv. Ostéogr. t. 2 (skull ♀), t. 7 (teeth).
Rhinocéros de Java, F. Cuvier, Mam. Lithog. t. (not good).
Sumatran Rhinoceros, W. Bell, Phil. Trans. 1793, p. 3, t. 2, 3, 4; Home, Phil. Trans. 1821, p. 270, t. 21, 22.
Rhinoceros sumatranus, Raffles, Linn. Trans. xiii. 268; Blainv. Ostéogr. t. (skull); Gerrard, Cat. Bones B. M. 282; Müller, Verhand. t. 35 (old and young); Blyth, P. Z. S. 1861, p. 306, 1862, p. 1; Journ. Asiat. Soc. Bengal, xxxi. 1862, p. 151, t. 3. f. 1, 2, 3.

Rhinoceros crossii, Gray, P. Z. S. 1854, p. 270 fig. (horns); Gerrard, Cat. Bones B. M. 282.

Hab. Sumatra (*Bell*); Tavoy, near Siamese frontier (*Blyth*); Pegu (*Theobald, B. M.*).

There are two skulls of this species in the British Museum:— 1. Adult, with a roughness on the forehead and nose made by the roots of the horns, from Pegu. 2. A skull of a two-thirds-grown animal, with the seventh grinder just appearing; it has the forehead and nose smooth. This was received from the Zoological Society, and is probably from Sir Stamford Raffles's collection from Sumatra.

The horn in the British Museum named *R. crossii*, I have no doubt, from the figure that Mr. Blyth gives of the skull (Journ. Asiat. Soc. Bengal, 1862, t. 4), he is right in referring to this species.

When I described this horn I was told by several persons that it was only the horn of an African Rhinoceros that had been artificially prepared and bent back after being boiled; but the colour and structure of the horn showed that that could not be the case, and that it was the horn of a Rhinoceros which I had not before seen.

In the Museum of the Royal College of Surgeons there is a beautiful skeleton (no. 2938) of this species, received from Sir Stamford Raffles. There are also three skulls of adult or nearly adult age,— viz. nos. 2935, 2936, and 2938; the latter is cut open longitudinally to show the brain-cavity. From the roughness on the forehead in the adult skull, the hinder horn must be situated further back in this species than in the African *Rhinocerotes*; the centre of the roughness is over the orbit. One of the skulls shows a rudimentary canine on one side of the upper jaw, placed in the front edge of the intermaxillary suture; this animal was just obtaining its first permanent molar.

The skull figured by Bell, and copied by Cuvier, represents the erect form of the occipital plane, as also does De Blainville's figure of the skull of a female. Mr. Blyth, who has seen these animals alive, thinks the horn that I provisionally described as *R. crossii* is the horn of an adult male *C. sumatranus*. He says that the horns of the females are smaller than those of the males—observing, at the same time, that there is no difference in size in the horns of the two sexes of *R. unicornis* of India. In Bell's figure of the skull the intermaxillaries are represented as curved downwards. This may have been an individual peculiarity; they are more or less bent down obliquely in the skulls I have seen, but always straight.

The *Rhinocéros de Java* of M. F. Cuvier (Mamm. Lithogr.) is only a better figure of the *R. sumatrensis*.

M. Cuvier, in the first edition of the 'Règne Animal,' says the *Rhinocéros de Java* is smaller than the *R. sumatranus*; but in the second edition he refers to his brother's figures in the 'Mamm. Lithogr.,' and alters his description; so that both *R. sumatrensis* and *R. javanensis* are established on the Sumatran Rhinoceros.

This species is erroneously called by Jardine, in the 'Naturalist's Library,' "*R. sumatrensis, the Lesser one-horned Rhinoceros.*"

The horns of the Rhinoceros are exceedingly difficult to procure; they are eagerly bought up at high prices by the Chinamen, who not only value them as medicine, but carve them into very elegant ornaments (Blyth, *l. c.* 158).

2. Ceratorhinus monspellianus.

R. de Montpellier, Marcel de Serres.
R. monspellianus, Blainv.
Rhinoceros megarhinus, De Cristol; Gervais, Zool. et Paléont. Franç. ii. 43, iii. t. 2.
Fossil, Hérault, France.

This species chiefly differs from *R. sumatranus* in the nose behind the base of the front horn being prolonged and subcylindrical. This species has been mixed up with *R. tichorhinus* (see Gervais, *l. c.*).

The African Rhinocerotes. *The skin uniform, without any strong fold, except at the junction between the head and body. Nose with two horns, one behind the other, front longest. Skull:—occiput and condyles not produced. Nasal bones free, produced, broad, rounded in front. Intermaxillaries rudimentary, very small. Upper cutting-teeth none. Lower jaw arched below, thick. Teeth* 28:—*I.* $\frac{0-0}{0-0}$. *C.* $\frac{0-0}{0-0}$. *P.M.* $\frac{4-4}{4-4}$. *M.* $\frac{3-3}{3-3}$.

Rhinaster, Gray, List Mamm. B. M. 1840; Gerrard, Cat. Bones B. M. 281.

I am not aware that any adult African Rhinoceros has been seen living in this country; and the external appearance of the species is chiefly known by the excellent figures given by Dr. Andrew Smith, in his 'Illustrations of the Zoology of South Africa,' who figures *Rhinoceros bicornis*, *R. simus*, and *R. keitloa*. The specimens of these three species, which he collected and had stuffed by M. Verreaux under his own superintendence, are in the British Museum.

There are two well-marked forms of these animals, characterized by the shape of the head and skull. The first (or short, blunt-headed, narrow-nosed group) includes two, and the second (or long-headed, broad, square-nosed group) includes one well-marked species, and probably another distinguished by the form of the horns, of which only the horns are known.

There is a not quite adult skull of *R. bicornis*, and two adult skulls and two very young skulls of *R. simus*, in the British Museum; but the skull of *R. keitloa* is only known from the description and figure of Camper. Cuvier figured two of these skulls, but considered them the adult and young of the same species. Unfortunately, *R. oswellii* is only known from the horns; I am not aware that any skin or bones of the species have been brought to Europe. There is a large number of the horns of each of the species in the Museum collection; and they were known to Parsons, who figured them in the

'Philosophical Transactions' for 1742 and 1743; and the specimens which he figured are now in the British Museum.

There is considerable divergence of opinion among travellers respecting the horns of the African *Rhinocerotes*. Sir Andrew Smith observes, "I do not think that the horns of the same species of African Rhinoceroses are subject to any great variations in respect to relative length."—*A. Smith.*

Capt. Cornwallis Harris, on the contrary, after describing the horns of *O. bicornis* as unequal, says "the horns are sometimes nearly of the same length." Further on he observes "that sometimes accident or disease renders the front horn the shortest of the two." Perhaps Capt. Harris had not such a good knowledge of species as Sir Andrew Smith.

"The relative length of the horns varies a little in different individuals of *R. bicornis*; but the hindermost one in both sexes is invariably much the shortest, and in young specimens it is scarcely visible when the other is several inches in length."—*A. Smith.*

"In *R. keitloa* the young have horns of equal length."—*A. Smith.*

3. Rhinaster. Black Rhinoceros.

Head short, high; forehead convex; nose rounded in front. Upper lip with a central conical process. Horns two, unequal. Skin smooth, not divided into shields by plaits. Skull short, high; the portion of the skull behind the hinder edge of the last or seventh grinder not so long as the portion in front of it, the occiput erect, the upper margin only slightly produced over it; forehead concave, shelving; nasal bones on the sides convex, subspherical above, rounded in front. Tooth-line curved, bent up at each end. Lower jaw thick in front. Shoulder with a more or less developed hunch.

"Living in herds; a 'browser,' feeding on leaves and young shoots of trees. It frequents forest and bush country, avoiding grassy plains."—*Kirk, P. Z. S.* 1864, p. 655.

A. *Horns cylindrical, conical, front recurved, hinder short; head short and high, swollen in front; upper lip subtruncate; shoulder-hump rudimentary.* Rhinaster.

1. Rhinaster bicornis. Bovili. B.M.

Horns unequal, cylindrical at the base, and conical, blunt, the hinder smaller, front recurved; shoulder-hunch rudimentary, neck-grooves well marked. "Pale brown;" upper lip truncated, scarcely produced in the centre.

Rhinoceros horn, Parsons, Phil. Trans. 1742, 1743, t. 3. f. 3, 4.

Rhinoceros bicornis, Linn. S. N. i. 104; Sparrm. K. Vet. Akad. Handl. 1778, t. 9; A. Smith, Ill. Z. S. Africa, t. 2.

Rhinocéros bicorne du Cap, part., Giebel, 200; Cuvier, Oss. Foss. ii. 29, t. 4. f. 7, t. 16. f. 10; Blainv. Ostéogr. Onguligrades, t. 3, 4 (skull &c.).

R. africanus, Desm. Mamm. 400 ; Harris, Portraits of Wild Animals of S. A. 81, t. 11 (horns at p. 85) ; Duvernoy, Arch. du Mus. vii. t. 8.

R. brucei, Blainv.

R. niger, Schinz, Syn. Mamm. 335.

Rhinaster bicornis, Gray ; Gerrard, Cat. Bones B. M. 282.

In the British Museum there is the skull of a nearly adult animal.

In the Museum of the Royal College of Surgeons is a very fine skull of an adult of this species (no. 2941), and the upper jaw covered with skin (no. 2942) and with the two horns attached to it. The horns are both circular at the base, and regular, conical, and blunt at the tip.

Schinz, who compiled a Monograph of this genus, in his Synopsis named a species *R. niger*, after Capt. Alexander's description of the *Black Rhinoceros* in his 'Travels into the Interior of South Africa.'

B. *Nose rounded in front ; upper lip acute in the middle. Skull :— face short—that is, from front of orbit to nasal, not so long as from same point to occipital condyle ; nasal rounded in front.* Keitloa.

2. RHINASTER KEITLOA. The Keitloa or Ketloa. B.M.

Upper lip with a central prominence, acute ; horns elongate, hinder compressed, sharp-edged, often as long as the front one, front one rather compressed, recurved ; shoulder without any hunch ; skin pale yellow brown ; skull short ; face short from front edge of the orbit to the end of the nasal, not so long as from the front edge of orbit to occipital condyle.

Var. 1. *Keitloa.* The horns of nearly equal length ; the hinder compressed, sharp-edged before and behind ; the front one rather compressed, broad and flat in front.

Rhinoceros horn, Parsons, Phil. Trans. lvi. 32, t. 2. f. 8, 9. B.M.

Rhinoceros ketloa or *keitloa*, A. Smith, Cat. S. A. Mus. p. 7, 1837 ; Illust. Zool. S. A. t. 1 ; Schinz, Syn. Mam. 337.

Rhinaster keitloa, Gray, List Mamm. B. M. ; Gerrard, Cat. Bones B. M.

Var. 2. *camperi.* The horns both compressed and sharp-edged in front and behind, the front one twice as long as the hinder ; upper lip with acute central prominence.

Rhinoceros bicornis capensis, P. Camper, Act. Petrop. 1777, ii. 193, t. 3, 4, 5, 6 (copied Blumenbach, Abbild. t. 7. f. *a*).

Rhinoceros bicornis (adult), Cuvier, Oss. Foss. ii. t. 4. f. 5 (skull copied from Camper).

Rhinoceros ——, Sparrman, Voy. ii. t. 3.

R. camperi, Schinz, Syn. Mamm. ii. 335 ; Monogr. t. 1.

Black Rhinoceros, Baker, Albert Nyanza, ii. 275 ; Nile Tributaries, fig. at p. 365 (head and horns).

Hab. South Africa (*Dr. A. Smith's type in B. M.*).

I have not seen the skull of this species, nor do I know any specimen existing in museums, unless the one described by Camper still exists.

"The length of the head of *R. keitloa*, in proportion to the depth, is very different from that of *R. bicornis*. Upper lip distinctly produced; inside of the thigh black. The horns are of equal length and development in the young animal."—*A. Smith.*

This species is peculiar for the length of the hinder horn; but Schinz describes the front horn as very long, and the hinder short, conical.

Peter Camper, in 'Act. Petrop.' (1777, part 2, p. 193), described the head of a two-horned Rhinoceros which he received from the Cape of Good Hope. He figures the head and the skull in great detail. The upper lip has a distinct central process, or prehensile lobe; and the horns are both compressed and sharp-edged before and behind, the front one is the longest and regularly curved, the hinder well developed and elongate. The end of the nose of the head and skull is rounded and not square, and the nasal bones are not truncate, as in the skulls of *R. simus* in the British Museum. I believe Camper's to be the first description of *R. keitloa* of Dr. A. Smith.

Schinz gave the name of *R. camperi* to a species which he says is *R. bicornis* of authors, and which is figured by A. Smith under that name in the 'Illustrations of South Africa;' but he describes the front horn as very long and recurved, and the hinder horn as small, triquetrous, *compressed*; while the hinder horn of *R. bicornis* is always conical, subcylindrical, with a circular base. Schinz's *R. camperi* appears to be a compilation from the figures of Sir A. Smith's *R. bicornis* and Camper's description and figure of the head of *R. keitloa*.

P. Camper, in giving the figures of this species, properly made the drawings like a diagram, without attending to the rules of perspective, so that the compass can be applied to any part. He gives a particular name to these figures, and calls them Catograph.

In Camper's figure the length from the back edge of the seventh molar to the front edge of the small intermaxillary is considerably greater than the distance behind the hinder edge of the last molar to the occipital condyle. In De Blainville's figure of *R. simus*, and in the two specimens in the British Museum, the length from the hinder edge of the seventh molar to the front edge of the small intermaxillary is rather less, or about the length behind the hinder edge of the seventh molar to the outer part of the occipital condyle.

The *Keitloa* is recognized as a species distinct from *R. bicornis* by the tribes of natives; they have a different name for the two species.

If Cuvier had had a series of the skulls of *R. bicornis*, or had seen a preserved specimen of the two animals, he would never have thought that the skull figured by Camper was the adult of *R. bicornis*. The skulls of the different species alter very little in form during the growth of the animal, when they have passed the very youngest, nearly fœtal, state.

4. Ceratotherium.

Head elongate, produced behind; forehead flat; nose very broad, square at the end; upper lip bovine, rounded. Horns two, very unequal, hinder small. Skin smooth, not divided into shields. Shoulder with a well-marked hunch. Skull elongate; the portion of the skull behind the hinder edge of the last or seventh grinder as long as the one in front of it; occiput erect, the upper margin much produced behind the condyle; forehead concave; nose straight, rounded; nasal bones very broad, convex above, truncated, with a sharp edge in front; lower jaw thick, tapering in front; molars large; teeth-line straight.

The skull of the very young animal has a very convex, nearly hemispherical prominence on the nasals, and is broad and rounded in front; but the prolongation of the hinder part of the skull is shown in the fœtal skull in which the milk-grinders are only just appearing, the proportion of the hinder and anterior portion being nearly the same as in the adult skulls; the occiput is erect, without any marked projecting crest.

"The first animal that disappears before firearms."—*Kirk, P. Z. S.* 1864, p. 655.

"Gentle and a 'grazer;' living in open plains, feeding on grass."—*A. Smith.*

1. Ceratotherium simum. Mahoohoo. B.M.

The front horn very long, slender, subcylindrical, recurved; hinder very small, conical; nose broad, high, square. "Pale grey brown; shoulder, buttocks, and belly darker." The face of the skull from the front edge of the orbit longer than the portion of the skull behind this place.

Rhinoceros horn, Parsons, Phil. Trans. 1742, 1743, t. 3. f. 6 (front horn).

Rhinoceros simus, Burchell; Blainv. Journ. de Phys. lxxi. 163, t. (head, horns bad); Cuvier, Oss. Foss. ii. 28; Burchell, Travels, ii. 75; A. Smith, Zool. S. A. t. 19 (animal); Cat. S. A. Mus. 9, 1837; Blainv. Ostéogr. Onguligrades, t. 4 (skull &c.); Duvernoy, Arch. du Mus. vii. t. 2, 3 (skull), t. 8 (skull, junior); Sclater, P. Z. S. 1864, p. 100.

R. burchellii, Desm. Mamm. 401.

R. simus (*Chicore*), A. Smith, Rep. 68, 1836; Harris, Sports in S. Africa, p. 371.

R. camus, Ham. Smith; Griffith, A. K. v. 746.

Rhinaster simus, Gray, List Mam. B. M. 1840; Gerrard, Cat. Bones B. M. 282.

?*Rhinoceros gordonii,* Blainv.

The Square-nosed or *White Rhinoceros* (*R. simus*), Harris, Portraits of Wild Animals of S. A. 97, t. 19 (horns at p. 101).

White Rhinoceros or *Witte Rhinaster,* Colonists, Cape G. H.

Chickore or *Mohoohoo,* Bukeiana and Matabite.

Hab. South Africa (*Burchell; Dr. A. Smith, type spec. B. M.*); Central Africa (*Kirk*).

There is a well stuffed young specimen of this species in the British Museum, and two skulls of adult and two of very young animals.

In the Museum of the Royal College of Surgeons is a very fine adult skull of this species (no. 2960 *a*) with the two horns attached to the skin. It was obtained from Mr. Gordon Cumming's collection. It is 35 inches long from the end of the nasal to the occipital crest. The front horn is very long, slender, straight, and recurved; the front edge of the horn is worn by the animal rubbing it on the ground.

De Blainville obtained, when he was in London, from Mr. Burchell the drawing of the head of this species (engraved in the 'Journ. de Physique'); but the horns were added after it passed out of Burchell's hands, and are not the horns of the species.

In the British Museum there are two skulls of very young animals of this species that were received with the adult skulls in the collection; the milk-grinders are being formed, but could only just have been seen through the gums. The skulls are elongate, subcylindrical, and have a rounded nose, with a large nearly hemispherical prominence near the end of the upper surface for the support of the front horn. The grinders are very large compared with the size of the skulls, and occupy a great part of the cavity of the mouth; the hinder one is placed in the centre of the length of the underside of the skull from the nose to the condyles. The larger of these young skulls (1003 *b*) is very like the smaller one, but there is a fourth grinder being developed behind the third one; it is not elevated above the edge of the alveolus, and has no smooth enamelled edge. The small first grinder is only very little more developed than in the smaller skull. The line of grinders occupies $6\frac{1}{2}$ inches. The intermaxillary bones are deficient. The palate ends, as in the smaller skull, in a line even with the back edge of the third grinder. The hinder part of the skull has lengthened more rapidly than the part in front of the edge of the palate. The nasal is slightly longer compared with the length of the skull than in the smaller specimen; they are $4\frac{1}{6}$ inches long, the entire length being very nearly 14 inches—that is to say, nearly three-tenths of the entire length. The front of the nasal is more dilated on the sides, and becoming broader and more truncated as in the adult skulls.

The lower jaw of this specimen is considerably longer than the other; and there is little difference in the state of the teeth, except that the second and third grinders on each side are higher out of the gums, rather more worn on the edge, and the first and fourth grinders are rather more developed and larger, the first on the two sides not being quite equally developed, but one more exposed than the other.

The smaller specimen (1003 *c*) has three grinders appearing; the smallest front one is least developed, hardly raised above the alveoli, and not showing any smooth enamel; the second and third grinders are nearly equally developed, the ridges being high and edged with enamel, the rest of the teeth are minutely rugulose; the hinder edge of the third grinder is on a line even with the front edge of the

hinder nasal opening. The skull is 12 inches from the intermaxillary to the convexity of the condyle; the teeth-line is $4\frac{1}{8}$ inches long. The facial portion (that is, the skull from the front of the intermaxillary to the front edge of the internal nostril) is only two-fifths of the entire length; it is the same length as from the front edge of the internal nostril to the suture between the basisphenoid and the basioccipital bone. Length from intermaxillary to front edge of internal nostril or end of palate 4 inches 7 lines, from end of palate to convexity of occipital condyle $7\frac{1}{2}$ inches. The intermaxillary of one side is lost; the other has a narrow lower edge, not showing any appearance of cutting-teeth. The nearly hemispherical prominence on the nose is hollow, with thin even parietes; the cavity extends far back, and is open behind. The face, from end of nasal to the front edge of the orbit, is shorter than the part of the skull behind it, being from front end of nasal to front edge of orbit 5 inches 4 lines, from front edge of orbit to occipital crest 7 inches 2 lines. Nasal bones short and broad, being about two-sevenths of the entire length of the skull to the occipital crest.

The lower jaw shows four grinders and a cavity behind the fourth; the second and third grinders are most developed, raised above the alveolus, and furnished with a smooth enamel edge; the first small grinder is just showing, as is also the case with the fourth grinder, which is rather more developed than the front one; neither of these teeth is raised above the edge of the alveolus. The front edges marked with two or three series of small circular pits; but no cutting-teeth are visible.

In the Free Museum at Liverpool is the head of a large specimen, collected by Mr. Burke in Lord Derby's exploring party. The skin of the head is stuffed, and the skull kept separate.

An adult skull without the lower jaw is in the Museum of the London Missionary Society in Bloomfield Street, London, E.C., that was obtained by the Rev. John Campbell.

The Rev. John Campbell gives a figure of the head of this animal before the skin was removed in his work entitled 'Travels in South Africa, Second Mission' (2 vols. 8vo, London, 1822), where it is called the "head of a Unicorn killed near the City of Mashow" (plate at p. 294 of the second volume). The artist has added a regular series of nearly equal-sized square teeth all along both jaws.

This figure is copied in Froriep's 'Notizen' for 1822, at vol. ii. p. 98; and a notice of the skull is given at p. 152 of vol. i. of the same journal.

2. Ceratotherium oswellii. Kobaaba. B.M. (horn).

The front horn very long, thick at the base, bent back and then forward at the end, the front of the tip worn flat.

Très-grande corne de Rhinocéros, Buffon, N. H. x. t. 8. f. 5.

Rhinoceros horn, Parsons, Phil. Trans. 1742, 1743, t. 3. f. 6.

Rhinoceros oswellii, Gray, P. Z. S. 1853, p. 46, f. (horn); Ann. and Mag. N. H. xv. 145.

Rhinoceros oswelli, Andersson, Lake Ngami, p. 386, f. (head), p. 388, f. (horn).

Kobaaba, Baines, Land and Water, July 28, 1866, f.

Hab. South Africa.

I have not seen the skull of this species, and I do not believe there is one in any European Museum.

Camper probably knew *R. oswellii*. He observes, "Cornu anterius A D in hoc specimene incurvum adeo fuit ut alterum E F H, tamquam inutile reddiderit. Verum non ita in omnibus; possideo alterius cranii partem, cujus cornu anterius rectum, et antrorsum inclinatum est."—*Camper, l. c.* 186.

Mr. Baines gave a fœtus of the *Kobaaba* to the Royal College of Surgeons (killed 3rd of June, 1862). He has shown me a series of drawings of the recently killed *Kobaaba*. One group represents the *R. simus* and *R. oswellii* side by side. The horns of the two are very different in appearance.

Mr. Baines says Mr. Chapman was informed by the natives that they had never seen a young *Kobaaba* = *R. oswellii*. Mr. Baines says that it is possible that the horn, being worn away at the end by the constant friction on the front as it passes through the bushes, may bend forward in the older specimens. The Kaffirs make the horns of the cattle bend by scraping them on the sides towards which they wish them to turn.

Schinz gives the name of *niger* to the Rhinoceros horn figured by Andersson; but he describes it as curved back, in the same words as he described the horns of the other African species.

Camper compares the labial process to a finger, and says it is not unlike the lobe at the end of the trunk of the Elephant.

See M. F. Fresnel's "Sur l'existence d'une espèce unicorne de Rhinocéros dans la partie tropicale de l'Afrique" (Comptes Rendus, xxvi. 1848, p. 281). See also A. Smith's 'Illust. Zool. S. A.' t. 1, where he says the natives mention a one-horned African species.

III. *Skin smooth, even. Skull* ——? *Internasal bony, short; the nasal, internasal, and the intermaxillaries united into one mass.* Asia and Europe, fossil.

5. Cœlodonta.

Nose with two horns. Skull elongate; face rather produced; nasal bones broad, rounded in front; cutting-teeth none; intermaxillaries very short; internasal bony, uniting the nasals, the intermaxillary, and maxillæ into one mass. Asia, Europe, Africa.

Rhinocéros à narines cloisonnées, Cuvier, Oss. Foss. ii. 64.

Cœlodonta, Brown, 1831.

Cœlodonta pallasii.

Rhinoceros, Pallas, Acta Acad. Petrop. 1777, ii. 210, t. 9; Nov. Com. Petrop. xiii. 417, t. 9, 10.

Rhinoceros tichorinus, Cuvier, Oss. Foss. ii. 64, t. 7. f. 1 (skull), t. 8, 9, 11, 14 (bones); Blainv. Ostéogr. t. 13 (from Pallas).

R. pallasii, Desm. Mam. 402.

R. antiquitatis, Blainv.

Rhinocéros de Sibérie, Cuv. Ann. Mus. xii. 19, t. 1, 3, 4.

Hab. Siberia, in the ice; Fossil, Himalaya &c.

The following measurements are given in inches and lines, taken by a pair of callipers; so they are a straight line (or chord) from point to point indicated, and not a line over or along the surface. I believe they are sufficient for all zoological purposes; but it is the fashion of some zoologists and comparative anatomists to give measurements with three, and sometimes even four places of decimals, this arising from their taking a metre, about 39 inches, for the *unit*, which requires one decimal place for any measured or part of a measured inch or space under 39 inches, two for any similar measurement under 4 inches, and three for any under 5 lines. Others, to avoid this evil, write of 20 or 130 *mm.* (millimetres); but this is as inconvenient, as the latter *unit* is as much too small as the other is too large.

On pointing out this evil to a naturalist, who has published long tables with such admeasurements, he replied, did it not look very scientific? I fear, unfortunately, there is a desire to mystify general readers, and a quackery in natural history as in other less ennobling studies.

I have never yet met with a naturalist, even German or French, that could show me the size of a bone marked in the French metrical system; few cannot do this with considerable accuracy when marked in inches or feet. The having a measurement of well-known different lengths, as yards, feet, inches, or lines, which bear a relation to some parts of our own bodies, is a great advantage not found in the metrical system.

	R. javanicus.				*R. unicornis.*					*R. floweri.*	*R. nasalis.*			*R. stenocephalus.*	*R. sumatranus.*		*R. bicornis.*	*R. simus.*				*R. keitloa.* Camper's figure.
	723 *a.*		723 *d.*		723 *e.*	722 *f.*	722 *d.*	722 *b.*	2975.	2934.	723 *b.*		723 *c.*	722 *e.*	1461 *a.*	1461 *b.*	1365 *a.*	1003 *c.*	1003 *d.*	1003 *a.*	1003 *b.*	
	in. l.		in. l.		in. l.	in. l.	in. l.	in. l.	in. l.	in. l.	in. l.		in. l.	in. l.	in. l.	in. l.	in. l.	in. l.	in. l.	in. l.	in. l.	in. l.
Length from end of nasal to centre of occipital condyles..	24	9	24	3	18 0	26	3	26 6	26 0	21 0	22 0	23	6	22 3	21 3	21 6	19 3	21 ?	12 0	14 9	29 9	28 9	27 0
Length from end of nasal to occipital crest	21	0	20	3	15 9	23	0	24 6	23 9	18 6	19 3	20	9	19 3	18 9	21 0	18 6	19 6	11 0	14 0	31 3	28 3	28 6
Length from end of nasal to front of orbit	11	0	10	3	7 6	11	6	11 9	11 9	9 3	9 9	10	0	9 0	9 0	10 9	9 6	8 9	5 3	6 6	14 6	14 0	10 3
Length from end of nasal to condylar cavity.....	20	3	20	3	15 6	22	3	22 3	22 3	18 0	19 0	19	9	19 0	17 6	17 9	16 9	17 6	9 6	11 9	22 6	22 3	22 3
Length of teeth-line of grinders..	9	9	10	3	7 0	11	0	10 6	11 0	7 9	9 6	10	3	9 6	7 6	8 3	7 6	9 0	4 6	7 0	12 3	..	14 0
Length of nasal, centre	..		..		6 9	..		..	..	8 3	..	8	0	7 6	8 6	..	7 3	6 0	3 0	4 3			
Length of lower jaw to upper parts of angle	17	9	18	6	14 9	20	3	20 6	20 3	17 3	..	17	9	17 0	17 3	..	15 3	17 6	9 9	11 9	21 0	22 0	22 0
Height of skull and lower jaw from angle to occipital crest..	17	9	16	6	12 3	20	6	21 0	20 6	16 0	..	16	0	14 6	16 0	..	13 3	15 9	8 0	9 0	24 6	21 3	21 3
Height of ramus of lower jaw to condyle	8	9	9	0	6 6	11	0	11 0	11 3	8 9	..	9	0	7 3	9 0	..	6 9	7 6	3 3	3 6	11 6	11 3	10 0
Width of occipital end	11	6	11	9	8 9	11	6	12 0	11 0	8 9	10 6	10	6	9 0	8 9	7 9	7 3	9 0	5 0	5 9	10 6	10 0	9 0
Width of hinder part of zygomatic arch.....	14	0	13	9	10 6	16	0	15 9	14 6	12 3	13 6	13	6	9 6	11 9	11 3	10 6	12 3	6 9	..	13 0	13 6	14 3
Width of wide part of forehead over orbits.....	8	9	7	9	6 0	8	9	9 3	8 3	7 0	7 3	7	0	6 3	6 3	6 3	5 3	7 3	4 0	..	10 9	11 6	
Width of nose at base of nasal opening.....	4	6	4	9	3 6	5	6	5 6	5 0	4 6	3 6	4	6	4 3	4 0	4 6	4 0	5 0	3 3	..	6 6	6 6	6 6
					jun.					jun.	adult	jun.		jun.	jun.	adult	jun.	jun.	fœtal	fœtal			

The measurements are from the nasal bones; the intermaxillaries are sometimes wanting. The measurements have been made by Mr. Edward Gerrard. The measurements of the skull of *R. keitloa* are from the skull given in Camper's plates.